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Understanding institutional change mechanisms for land use: Lessons from Ecuador's history

Claudia Coral [a], Wolfgang Bokelmann [a], Michelle Bonatti [a,b,*], Robert Carcamo [a], Stefan Sieber [a,b]

[a] Department of Agricultural Economics, Humboldt Universität zu Berlin, Berlin 10099, Germany
[b] Leibniz-Centre for Agricultural Landscape Research, Eberswalder Straße 84, 15374 Müncheberg, Germany

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ABSTRACT

Ecuador constitutes a fascinating case study to explore land policies and reforms. Since colonial times, it has experienced prolonged and ongoing struggles to transform land institutions. This paper investigates how, across levels, historic institutional factors affected land-use decision making in the Mindo parish and western foothills of Pichincha, Ecuador, as perceived by its landowners. Following techniques and procedures for developing grounded theory, we identify four main periods of institutional change related to land by relying on the narratives of landowners. These periods are: a) colonial institutions – hacienda feudal modes of production; b) the way toward an Agrarian Reform and Colonization Law; c) rural development after the Agrarian Reform; and d) forest conservation incentives versus 'neo-extractivism' practices. We reconstruct and explore these in light of the existing literature. Along with individual and collective perceptions, we are also concerned with the drivers underlying these institutional changes and the structure of these changes. Lastly, we discuss and provide conclusions on the key issues that help us explain institutional change in the study area, including theoretical explanations about cognitive variation (cultural-cognitive), power relationships, individual ability to change and perceive, as well as the system's capacity to reorganize, persist, and reproduce.

1. Introduction

Since colonial times, Ecuador has witnessed prolonged and ongoing struggles for territory and livelihood, struggles rooted in history and accompanied by powerful land related mobilizations (Goodwin, 2017). In addition to high cultural diversity, Ecuador's varied topography and climate host a great diversity of ecosystems and life zones (Myers, 1988, Cuesta et al. 2017). Hence, Ecuador constitutes a fascinating case study to explore land policies and reforms. In the specific case of land-use change in Ecuador, the misunderstanding of institutional change has resulted in ill-conceived land reforms that do not necessarily reflect the local system's needs. Grounded in poor local knowledge, these are often embedded in global processes, resulting in persistent poverty, social inequalities, and environmental degradation.

Scientists trying to understand institutional change processes employ several approaches, including sociological institutionalism, rational choice institutionalism, historical institutionalism, and cognitive psychology. In the field of land-use policy, efforts are directed toward finding ways to communicate the biophysical effects of land-use and land cover change and to provide tools for policymakers (Brown, 2019; Mustaphi et al., 2019; Duveiller et al., 2020). Other areas of research focus on understanding how specific land-use policies work as drivers for adaptation, mitigation, and restoration processes within a particular context, or the effects of a specific policy on land-use change (Li, et al., 2017; Sun, et al., 2017; Linhares Rezende et al., 2018; Heidarlou et al., 2019; Ortega-Pacheco et al., 2019). Other studies advance knowledge on the simulation of land-use changes under alternative policy scenarios (Manuschevich and Beier, 2016; Kim, et al., 2019; Rega et al., 2019). The work undertaken by each of these groups of scholars has generated significant advances, with existing theories covering important aspects of institutional change.

Nevertheless, the development of general models that can comprehend both exogenous and endogenous sources of institutional change is challenging, as researchers typically focus on the functions that institutions come to perform, rather than the system as a whole and the mechanism by which institutions are created (Mahoney and Thelen,

* Corresponding author at: Leibniz-Centre for Agricultural Landscape Research, Eberswalder Straße 84, 15374 Müncheberg, Germany.
E-mail address: michelle.bonatti@zalf.de (M. Bonatti).

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2009). As some historical institutionalists claim, institutions are not typically created for functional reasons; they advocate for historical research to trace the processes behind the creation and persistence of institutions, comparing 'real' world cases rather than variables (Steinmo et al., 1992; McNamara, 1998; Thelen, 1999; Lieberman, 2002; Pierson, 2004; Katznelson and Weingast, 2007; Mahoney and Thelen, 2009; among others). As Mahoney and Thelen (2009) state, to reach the potential of theorizing, there is a need to go beyond classification to develop causal propositions that locate institutional change sources, which are not merely exogenous shocks or environmental shifts. As Ostrom (2008) claims, we cannot develop a general theory of institutional change until we understand the processes of change in multiple and varied settings.

These findings and methodology contribute insights into the key issues that help us explain institutional change in land-use situations. As Coral et al. (2020) observe, individual or family level decisions are affected by factors from many levels, including institutional/historical factors, ranging from the international/global, national, state/-city/community levels, to the group/ collective action level. Through experiential learning and interaction with the environment, individuals and communities have the power to bring about processes of change, for instance reforestation and deforestation processes.

This paper investigates how historic institutional changes at different levels have affected land-use decision making in the Mindo parish and western foothills of Pichincha, Ecuador, as perceived by the study participants. Specifically, we are interested in key issues that help us explain the mechanism of institutional change in the Ecuadorian Western foothills' context.

First, following grounded theory methodology, we identify, based on interview material, four main relevant periods for institutional change in the study area: a) colonial institutions – hacienda feudal modes of production; b) the way toward an Agrarian Reform and Colonization Law; c) rural development after agrarian reform; and d) the early 21st century period, marked by forest conservation incentives such as payment for ecosystems services and programs of environmental restoration on one hand and 'neo-extractivism' practices on the other. After gathering theoretical insights, emergent issues are explored. Subsequently, we reconstruct the aforementioned institutional changes related to land based on a literature review at national level (Section 3.1). We then explore the aforementioned institutional changes, as perceived by the individual and collective consciences. Section 3.2. provides a summary of theoretical insights related to institutional change based on interview material, aiming to demonstrate how historical/institutional changes are perceived and narrated by the people who lived these changes in the Mindo parish and western foothills of Pichincha, Ecuador.

Since this study is explorative, during the discussion, based on both empirical data at various levels and the literature review, we identify and discuss key issues that contribute to understanding institutional change in the context of the Ecuadorian Western foothills. These identified factors allow us to provide recommendations for future land use policy research.

2. Materials and methods

Fieldwork for the study was carried out in the Mindo parish and western foothills of Pichincha, Ecuador. Employing techniques and procedures for developing grounded theory (GT), we explore cognitive aspects and the nature of reality by relying on the narratives of 34 landowners (27 men and 7 women). Narratives are used by scholars to examine the interconnectedness of human agency and social structure and the temporality of historical events in processual ways (Gotham and Staples, 1996). With the support of the Mindo parish authorities, the process of data collection was informed by theoretical sampling (Corbin and Strauss, 2015, pp. 135–152), which is directed by evolving theory rather than by a predetermined population. Following GT, research analysis began immediately after the first round of data collection. The concepts that emerge at this stage serve to generate questions and these questions lead to more data collection to learn more about said concepts, until the point at which major categories are fully developed, show variation, and are integrated into a theoretical analysis of the substantive area (see Fig. 1) (Corbin and Strauss, 2015, p. 135).

We selected GT as a method because it provides rigorous techniques and procedures that can be used to uncover the beliefs and meaning that underly action and examine rational and non-rational aspects of behavior (Corbin and Strauss, 2015). Furthermore, techniques and procedures for developing grounded theory allow us to understand the process and context underly land-use change in the study area.

To go beyond description and construct theory, we link action-interaction to the conditions under which it occurs and the outcomes that result when certain actions and interactions occur as suggested in (Corbin and Strauss, 2015). In this vein, our analysis (see Fig. 1) begins with open coding to identify concepts and linkages, then we proceeded to analyze data for context and process. The 34 interviews, each lasting about one hour, were audio-recorded and transcribed. Particular attention was paid to biographical information and public history from a past and present perspective (collective memory and oral history). An initial checklist of questions guided the process. Although employing a question guide, it was not always needed. GT studies are explorative; this implies that the interview questions are framed in a manner that provides a high degree of flexibility. In this regard, the interviewer can explore the topic in-depth and ask further questions based on new insights gained during the interview.

With the gathering of initial theoretical insights (see Coral et al., 2020), relevant issues emerge that require further analysis. Thus, in this paper, we analyze the topic of institutional change, specifically four principle periods related to historical/ institutional change identified through narratives and the life histories of landowners of the Mindo parish and western foothills of Pichincha, Ecuador (see Section 3.2). These identified periods are then analyzed in the light of existing literature. For this, relevant literature on institutional change (articles, books, laws, regulations, and other historical documents) was reviewed. Based on this literature review, we reconstruct these four periods in Section 3.1. Although the starting point of this research is the analysis of narratives, to provide context and position the reader in the main historical periods, we present the reconstruction based on literature review at national level first (Section 3.1.), then we explore perceptions surrounding these institutional change in the study area (Section 3.2.).

Following the guidance of GT as a method, strategies were followed to achieve rigor such as: letting the participants guide the process, memoing to capture the logic of the analysis; participants validation of the theory scheme; offering sufficient detail and including raw data to achieve fidelity; in vivo coding using participants words and concepts; and participating in peer review; among others.

2.1. Study area

The Mindo and western foothills of Pichincha volcano, Ecuador, shown in Fig. 2, is selected because of its extensive cloud forests (Mindo-Nambillo Protected Forest), its conservation history, the emergence of interesting models for sustainable agriculture, and the creation of private conservation networks (see Section 3.2.). Until around 1560, this area was inhabited by the Yumbos, a pre-Inca ethnic group. This place was abandoned after the Pichincha volcano's disastrous eruption in 1660 and re-inhabited in 1800 by independence leaders and aristocratic families. By 1900, 4 families of hacienda owners and its workers settled permanently in the area. In the 1960s and 70s, the Land Reform and Colonization Act was implemented in this area. New arrivals came in the 1970s and 1980s when some workers and their families settled in the area to work in the timber industry and several families immigrated from southern parts of Ecuador to seek agricultural work. Thereafter, a conservation movement started followed by tourism activities (see Section 3.2). The area's high biodiversity is recognized internationally;

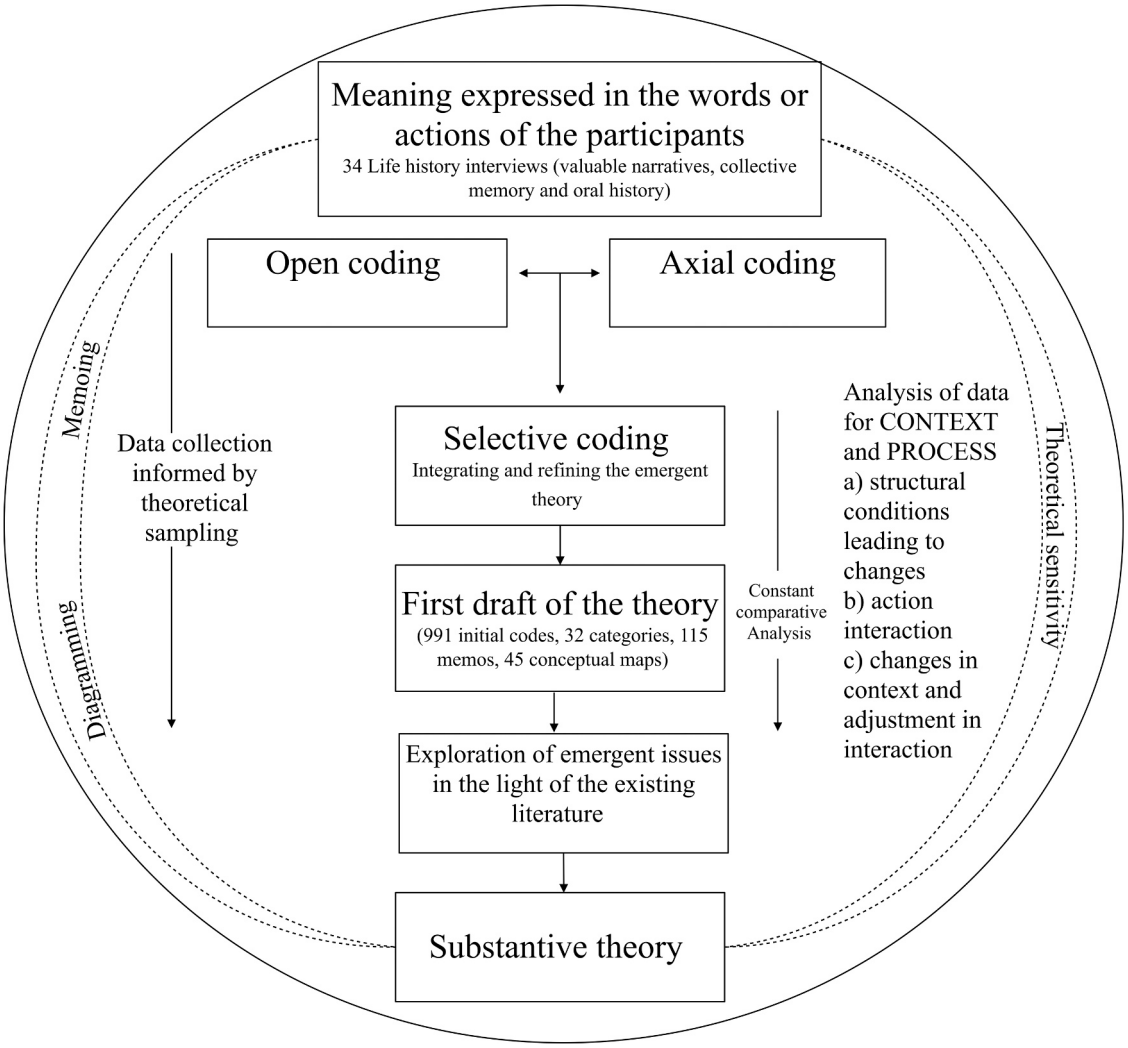

Fig. 1. Summary of the methodology adapted after (Pryor et al., 2009).

for instance, the area was declared Important Birth Area (IBA) (BirdLife International, 2020). Several rivers characterize the site and, as it is in the influence zone of the Bosque Protector Mindo Nambillo, it includes a cloud forest protected area of around 19,200 ha. Since 2018 the Mindo area is included in the newly created Chocó Andino de Pichincha Biosphere Reserve. However, 43 mining concessions are menacing this high biodiversity area and its water reserves (Coral et al., unpublished results).

3. Results

3.1. Reconstruction of historical/institutional changes related to land in Ecuador

Using secondary sources, we elaborate on four previously identified historical/institutional change periods related to land use in Ecuador. These are summarized in Table 1.

3.1.1. Colonial Institutions–Hacienda feudal modes of production

Historical records show that in Ecuador, already in the sixteenth century, colonial abuse triggered complaints against the confiscation of lands, tribute payments, labor drafts, and censuses (Becker, 2008, p. 3). In the nineteenth century, most indigenous people's subordination took place on the so-called "haciendas" (large landed estates). Some haciendas originated as land grants to religious orders. After 300 years of colonial domination, in 1830, Ecuador was constituted as an Independent Republic.

However, "latifundist" sectors assured that the new laws continued guaranteeing the usurpation of communal and fiscal lands (Brassel et al., 2008, p. 17). When the government expropriated some church-owned haciendas in 1904, these haciendas were rented and only the wealthiest could afford the high rents (Becker, 2008, p. 37). The community of peasants whose lands were being encroached upon by the haciendas was forced to work for the hacienda in exchange for a salary, products, and access to resources to feed their families (Thurner, 1993, p. 52). These workers (huasipungueros) could use a small plot of land (huasipungo) and had limited use of resources such as water, grassland, and firewood. However, in exchange, landowners expected workers to mobilize their entire family to complete assigned tasks up to 5 days a week in exchange for a minimum salary, while still others (arrendatarios and partidarios) were granted plots of some type in a sharecropping arrangement (Handelman, 1980; Becker, 2008; Fauroux, 1988). Hacienda (hacendados) landowners often collaborated with civil authorities, rural police, and parish priests to control indigenous labor and resources (Becker, 2008; Fauroux, 1988). Protests and revolts happened frequently. For instance, in 1777, a census precipitated revolts again Spanish rule. Later, in the 1920s, indigenous people began forming rural syndicates and participating in political debates (Becker, 2008, p. 4). Eloy Alfaro, leader of the 1895 "Liberal Revolution," regulated, but did not abolish, this labor system by establishing a minimum wage and eliminating religious

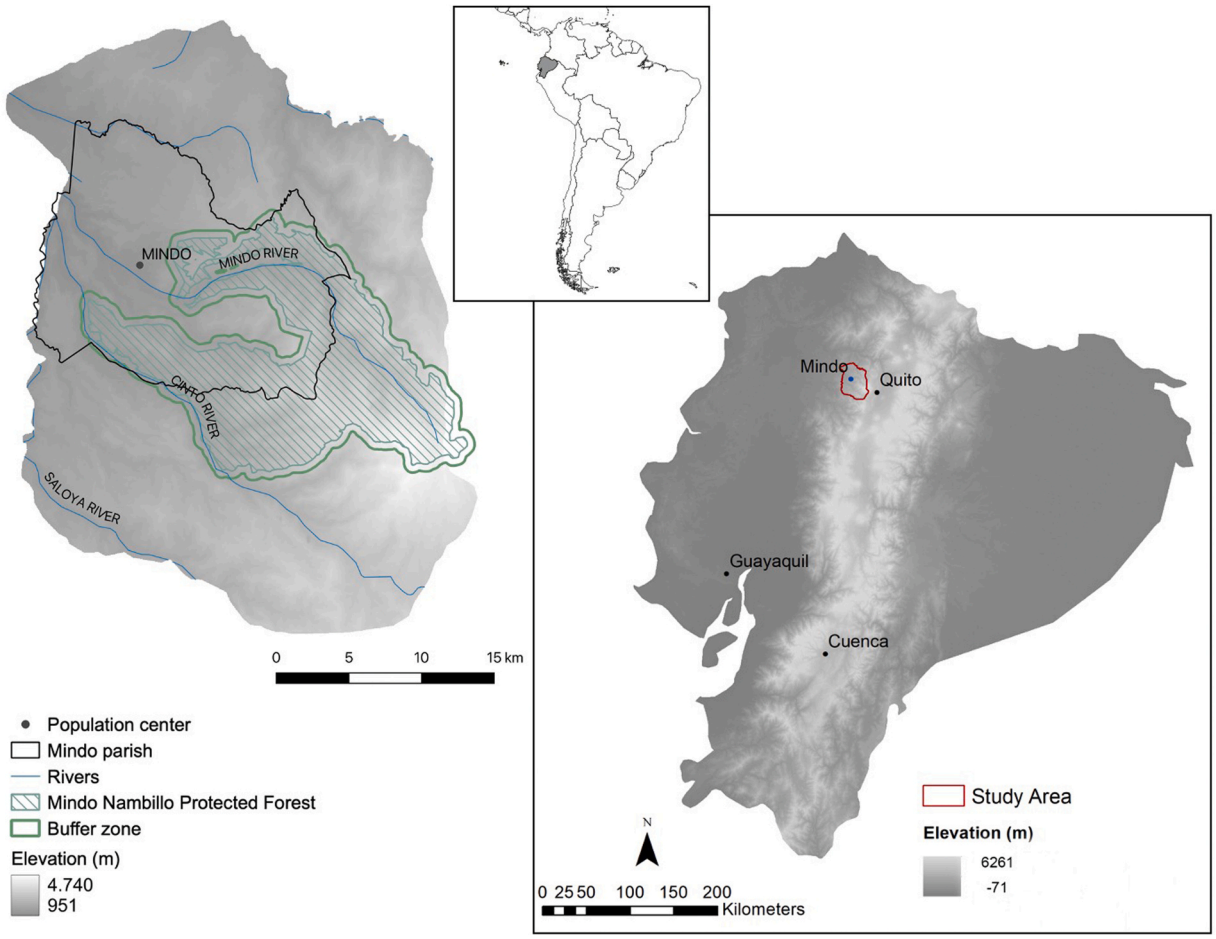

Fig. 2. Mindo and the western foothills of Pichincha volcano area. Elaborated based on IBA Dataset, Birdlife International and Provincial GAD Pichincha Information Systems.

instructions. However, these reforms subjugated indigenous workers to a central state power under elite control (Becker, 2008, p. 9). According to the 1954 National Agricultural Census, prior to the first agrarian reform legislation, 2% of the nation's agricultural units of 100 ha or more controlled 66.6% of the agro-livestock land (see Table 2).

Systems and laws of coerced labor and government control of indigenous labor on state-owned haciendas persisted until the 1964 reform (Becker, 2008, p. 9) and beyond, as we subsequently show.

3.1.2. The way toward an Agrarian Reform and Colonization Law

During the 1920s and 30s, existing agricultural syndicates contributed significantly to the subsequent indigenous movements, together with socialist movements, which introduced new tools and tactics for demonstrations (Becker, 2008, p. 10).

On July 9, 1925, the July Revolution, led by young military officers against coastal liberal oligarchy, resulted in a coup. This oligarchy grew as at the beginning of the 20th century, as exports of cacao increased to the point that Ecuador was among the leading exporters of cacao between 1895 and 1914. These exports constituted up to 70% Ecuador's total exports (Larrea, 2006, p. 28). These cocoa growers established close linkages with the Guayaquil (coastal city) banking system to form an ascendant banking elite, which provided the economic backing for the Liberal Party to grow (Handelman, 1980, p. 3). The July Revolution coincided with an economic situation exacerbated by a cacao disease, which reduced demand for Ecuadorian cacao in the international market, causing prices to drop (Becker, 2008, pp. 18–19; Handelman, 1980). However, the same elite later became the leading exporter of bananas. The new government launched a series of new reforms regarding labor legislation and created a Social Welfare Ministry. Shortly after the July Revolution, in 1926, the Ecuadorian Socialist Party (PCE) was established (Páez Cordero, 2001). Hundreds of land conflicts are recorded during this period (Becker, 2008, pp. 26–27). Indigenous leaders combated abuses on haciendas employing strategies such as strikes, union organizing, regional congresses, sit-ins, and land invasion (Becker, 2008, p. 28). In this regard, the hacienda was the place where the indigenous revolution took place, with several women leading the fight. On the coast as well as in the highlands, peasant organizations presented demands to the National Assembly requesting a limit on the size of landed estates, the creation of agrarian cooperatives, the power to decide on local authorities and services, as well as infrastructure, including schools, hospitals, and roads (Becker, 2008, p. 33). In 1930, through their strategic alliance with leftist groups, indigenous organizations struck for the first time (Becker, 2008, pp. 49–57).

One year later, indigenous leaders and activists organized the First Congress of Peasant Organisations, where delegates representing peasants and indigenous people from both the coast and the highlands, women with babies, and men, all marched together (Becker, 2008, pp.55–56). In response to these protests, the Ministry of Social Welfare proposed creating local committees to resolve land conflicts between landlords and workers. Although these committees would comprise a local authority, a hacendado, and an indigenous leader designated by the government, they were not welcomed by the indigenous community; rather, these were interpreted as an attempt to infiltrate their organizations (Becker, 2008, pp. 66,67). Several legislative reforms followed.

In 1936, the Ley de Tierras Baldías y Colonizacion (Empty Land and Colonization Law) was enacted, its intent was to resettle landless

Table 1
Summary of the main institutional changes related to land use in Ecuador.

16th century to 1960s	1960–1990s	1990–2000s	from 2007 to 2020
Colonial institutions - hacienda feudal modes of production	Agrarian Reform and Colonization Law	Political discourse shifted from agrarian reform to rural development	Forest conservation incentives vs. neo-extractivism
16th century–colonial abuse triggered complaints about the confiscation of lands, tribute payments, labor drafts, and censuses.	1960s–Growing of the indigenous and peasant movements, the attempts to agricultural modernization of the landowners, and the political influence of the Cuban revolution and agrarian reform triggered the government to consider the reform of the existing agrarian system.	A 1994 law officially derogated the legislation of the agrarian reform. The Ley de Desarrollo Agrario eliminated restrictions on property transfers and guaranteed the property of middle and big estates. The fragmentation of communal lands and its transaction was authorised.	2007–Creation of community conservation areas and examples of national schemes for conservation payments in other countries formed the basis to start designing what is now known as the Socio Bosque program in 2008.
19th century–most of the subordination of indigenous people took place in the so-called "haciendas."	Agrarian Reform and Colonization Laws 60s and 70s, on the one hand, incorporating peasant producers and agricultural cooperatives into markets and promoting capitalist production on the other.	In the context of the Green Revolution, large-scale land ownership, irrigation, improved seeds, fertilizers, pesticides, machinery, and a low-wage paid labor force marked the pace of the new agrarian development.	Inclusion of good living concepts and mother earth rights in the Ecuadorian Constitution.
1830–Ecuador was constituted as an Independent Republic, however, latifundist sectors assured that the new laws continued to guarantee the usurpation of communal and fiscal lands.	1980s–Orientation towards exportation of "exotic" products such as roses, mangos, and bananas among others were the dominant tendencies on the coast.	1980s–Orientation toward exportation of "exotic" products such as roses, mangos, and bananas among others were the dominant tendencies on the coast.	Recently ratified in the National Strategy of Biodiversity 2015–2030, governmental strategies seek to develop strategies to progressively abandon the matrix dependent on the extraction of non renewable resources and raw material exportation.
1920s and 1930s agricultural syndicates contributed to the subsequent indigenous movements, together with socialists, which made significant contributions such as introducing rural activists to new tools and tactics to demonstrate.	Conservation agencies and international organisations were active in promoting conservation programs.	Conservation agencies and international organisations were active in promoting conservation programs.	2010s marked by (neo) extractivist (large-scale natural resource extraction) development.

Source: author elaboration; see Fig. 6.

peasants on public lands. Rather than breaking up hacienda lands to form agricultural cooperatives, this law opened "unused" territory for settlement to avoid an agricultural crisis (Becker, 2008, p. 71). However, it was not sufficient to change the land tenure system and the leftists pressed for deeper reforms.

During the mandate of the President Alberto Enriquez in 1938, labor unions drafted a Labor Code that regulated minimum wages and access to resources like water and pasture (Barsky, 1984, pp. 6,27). All these changes opened the door for indigenous movements and the creation of the first Indigenous Federation (FEI) of Ecuador in August 1944, which triggered further agrarian activism (Barsky, 1984, pp.78).

During the 1950s and 60s, based on a coastal export-oriented banana boom and modernized agriculture, the traditional landholding oligarchy increased (Schodt, 2009). Hacendados, who were worried about the increasing communist subversion and rural indigenous organization, sought to intimidate indigenous leaders and debilitate their syndicates. At the beginning of the 60s, in addition to an increase of violent incidents in the haciendas (Brassel et al., 2008, p. 17), many processes, including the growth of the indigenous and peasant movements, attempts of agricultural modernization by the landowners, and the political influence of the Cuban revolution and agrarian reform caused the government to consider reforming the existing agrarian system (Barsky, 1984; Becker, 2008, pp. 124,125; Goodwin, 2014).

Between May 1958 and April 1961, the labor inspector reported 173 labor conflicts with 77 of these on haciendas (Becker, 2008, p. 124). In October 1960, the First National Peasant Conference took place, bringing together peasants from the coast, indigenous people from the highlands, and the communists (Becker and Tutillo, 2009, p. 156). As analyzed in Checa et al. (2019), this conference is a milestone in subject land rights as it provided space to discuss an agrarian reform that included not just extending credit and technical assistance but also implementing more structural changes and addressing broader social concerns like basic services and roads, universal suffrage, the election of local officials, and bilingual education.

Alerted by what might happen, as stated by Becker (2008), forward-thinking hacendados began giving their workers land to control the process. Pressure and protests for Agrarian Reform culminated in a massive demonstration on December 16, 1961, organized by indigenous and peasant organizations and supported by students' organizations (Becker, 2008, p. 131). It was not until September 1962 that socialist deputy Alfredo Perez Guerrero presented the Ecuadorian congress with a proposal to abolish the huasipungo system; however, many other protests were needed to accelerate the process since elites went on a counteroffensive (Becker, 2008, p. 133). Under this situation, a right-wing conspiracy, advised by CIA, sought to overthrow the Arosemena government, which resulted in a military coup in July 1963 (Ayala and Quintero, 1990, p. 374). The new military government imprisoned hundreds of political activists, while the FEI and PCE collapsed (Ayala and Quintero, 1990, p. 374). On July 11, 1964, the military government promulgated the Ley de Reforma Agraria y Colonización (Agrarian Reform and Colonization Law) under the American led Alliance for Progress. Structures like the Instituto Ecuatoriano de Reforma Agraria y Colonización (IERAC) designed and implemented the reform between 1964 and 1994 (Goodwin, 2014, p. 578). Literature shows that the objectives were quite ambiguous; on the one hand, incorporating peasant producers and agricultural cooperatives into markets while promoting capitalist production on the other (Goodwin, 2017, p. 571). While land reform regulated and redistributed land, it stimulated and expanded both land markets and the agricultural frontier (Goodwin, 2017, p. 573). Under the pressure of the Agrarian Reform, some local hacendados started to sell their lands or divide them between their family members but at a price that far exceeded the economic capacity of the indigenous families (Goodwin, 2017; Becker, 2008; Larrea, 2006). Landowners were given twelve months to phase out the huasipungo system, with ex-huasipungueros men supposed to receive their plots, complete with access to water and firewood resources. Women gained rights and were no longer forced to work unpaid. The legislation outlawed land invasions and sough to eliminate leftist approaches in rural organizing efforts (Goodwin, 2017, p. 138). According to this initial reform in 1964, the land size minimum in coastal estates was of 2500 plus 1000 ha of

Table 2
Evolution of land tenure in Ecuador.

Stratum	1954[a]				1974[a]				2001[a]				2013[b]			
	APU	%	Area	%	APU	%	Area	%	APU	%	Area	%	APU	%	Area	%
< 1 ha	92,387	26.8	46,000	0.7	145,550	28.0	63,263	0.9	248,398	29.7	95,834	0.8	202,694	24.1	80,065	0.7
1–4.99	159,299	46.3	386,200	6.0	201,297	38.8	475,405	6.8	286,911	34.3	678,391	5.5	292,073	34.7	683,846	5.8
5–9.99	36,250	10.5	271,500	4.2	54,935	10.6	377,756	5.4	101,066	12.1	688,987	5.6	112,257	13.3	756,621	6.4
10–19,99	21,400	6.2	294,300	4.6	41,425	8.0	557,535	8.0	75,660	9.0	1017,807	8.2	91,384	10.9	1218,697	10.4
20–49,99	19,415	5.6	591,500	9.2	42,537	8.2	311,974	4.5	76,792	9.2	2372,027	19.2	91,755	10.9	2802,085	23.8
50–99.99	8327	2.4	547,200	8.6	22,276	4.3	1352,697	19.5	34,498	4.1	2242,409	18.1	35,848	4.3	2273,060	19.3
100- >	7156	2.1	4263,000	66.6	11,091	2.1	3810,773	54.8	13,557	1.6	5260,375	42.6	15,034	1.8	3943,983	33.5
Total	344,234	100	6399,700	100	519,111	100	6949,403	100	836,882	100	12,355,830	100	841,045	100	11,758,357	100

[a] National Agricultural Census of 1954, 1974, 2001, Ecuadorian Institute of Statistics and Censuses (INEC).
[b] Referential data, Survey of Agricultural Area and Production (ESPAC), INEC 2013.

natural grasslands ha and 800 ha in the highlands plus 1000 ha of páramo (high-altitude ecosystem areas), with an exception for those enterprises promoted and organized by the IERAC (Junta Militar de Gobierno, 1964). The rights for exploitation and possession of agricultural lands left unproductive for more than 8 consecutive years were transferred to the IERAC (Junta Militar de Gobierno, 1964).

The Agrarian Reform made little progress in addressing the underlying structural problems; rather, much of the legislation reinforced socioeconomic trends while fostering capitalist penetration in the countryside and landholding concentration. In many cases, the indigenous producers and communities received land estates that were unsuitable for cultivation, in the foothills of the Andean Mountains with high slopes, resulting in erosion and soil degradation (De Zaldívar, 2008.; Goodwin, 2017; Larrea, 2006; Becker, 2008). Ultimately, the government expropriated relatively little land (Handelman, 1980; Bernal, 2007; Becker, 2008, pp. 138–139; Martínez Valle, 2016). Additionally, people resented that they were working for a different landowner – this time called IERAC – that provided farmers neither training nor financing, thus resulting in poor administration of cooperatives (Becker, 2008).

As Goodwin (2017) states, indigenous, peasant, and left-wing organizations, despite all their efforts, were unable to exercise real influence over the legislature. The lack of an enabling political environment and bureaucracy resulted in an agrarian reform that largely reflected landowning elite interests. For example, the IERAC steering committee comprised state officials and landowning elite representatives but excluded spokespersons of the indigenous and peasant population (Goodwin, 2017, p. 578). This situation again created space for indigenous peoples to oppose the land reform, which was manifested in the radicalization of the existing indigenous movements (Goodwin, 2017, p. 579). With the return to a civilian government in 1966, indigenous organizations, students, and workers again called for a new agrarian reform program that included indigenous and peasant representation in the IERAC (Becker, 2008, p. 140). Velasco Ibarra, who won elections in 1968 and two years later, declared himself a dictator, decreeing the second Agrarian Reform Law in 1973. This new law was more radical in the sense that it required the "efficient" exploitation of at least 80% of the land and productivity as established by the Ministry of Agriculture (Registro Oficial No. 410, 1973). The new reform again resulted in little gain for indigenous people and smallholder farmers. Between 1964 and 1994, the total surface intervened by the agrarian reform was approximately 900,000 ha, 3.4% of Ecuador's land surface. This number is far below colonization over the same period, which reached 7 times more land, affecting 23% of the national territory (Gondard and Mazurek, 2001). In some areas, the agrarian reform acted as an accelerator for modernization and globalization. Statistics show that the Ecuadorian economy grew between 1948 and 1982, due to the banana boom and the subsequent oil boom (Schodt, 2009; Larrea, 2006). In fact, when oil was discovered in the Ecuadorian Amazon region, in April 1967, the Ecuadorian government looked forward to investing heavily in national development (Wasserstrom and Southgate, 2013, p. 33).

When comparing data on land tenure obtained in three agricultural censuses carried out in 1954, 1974, and 2001, plus the 2013 Survey of Area and Agricultural Production (see Table 2), important variations are observed with respect to the control of the agricultural area, but not in terms of inequity in land tenure. In fact, neither the expansion in the number of farms between 1954 and 2001 (492,648 new farms), nor the extension of the agricultural area (5956,130 ha), attenuated the inequitable nature of land tenure (see Table 2).

3.1.3. Rural development after Agrarian Reform

In the 1980s and 1990s, there was a shift in the political discourse from agrarian reform to rural development. In fact, in 1994, a new law officially derogated the Agrarian Reform legislation. The so-called Ley de Desarrollo Agrario (Agrarian Law of Development) was drafted in collaboration with Utah University; it promoted the land market,

eliminated the restrictions in property transfers, guaranteed the property of middle and big estates, and authorized the fragmentation of communal lands and its transaction. The law also eliminated the, at that time already obsolete, IERAC, replacing it with the Instituto de Desarrollo Agrario (INDA) (Brassel et al., 2008, pp. 19, 20). In 2001, agricultural production units smaller than 5 ha represented 64% of the total agricultural production units, but concentrated only 6.3% of the agricultural lands (including ranching), while agricultural production units bigger than 100 ha, which represented only 1.6% of all the agricultural production units, concentrated the 42.6% of the agricultural lands (see Table 2).

The orientation toward the export of "exotic" products like roses, mangos, and bananas were the dominant tendencies on the coast. The highlands provided the national market with potatoes, legumes, cereals, meat, and dairy products, but at much smaller scales of production. Framed within the context of the Green Revolution, large-scale land ownership, irrigation, improved seeds, fertilizers, pesticides, machinery, and a low-wage paid labor force marked the pace of the new agrarian development, in cooperation with the United States Department of Agriculture (USDA), the Organization of American States (through the Punta del Este Conference), and other organizations like the FAO (IERAC, 1965; Handelman, 1980; Cuvi, 2009; Carrillo, 2016). Historical documents show that a project of the United Nations Development Fund proposed improving agricultural productivity in areas affected by the Agrarian Reform through the use of fertilizers, modified seeds, improved cultivation methods, and the appropriate use of fungicides and insecticides (IERAC, 1965). This tendency was welcomed by big landowners but fought by small indigenous smallholders, who made up many of the people in rural Ecuador. The Agrarian Reform had caused peasants and indigenous peoples to abandon their land, moving to work in the cities; hence, sub-employment in the cities rose.

Rural development in Ecuador in the 1980s and 90s was marked by the proliferation of NGOs and financial institutions, along with the associated development models (De Zaldívar, 2008). Embedded in an international conservation movement and perception of a limited world, the 1970s was a period of great progress for nature conservation in the tropics. In 1972, the UN Environment Conference in Stockholm brought together political leaders and conservationists for the first time in a formal intergovernmental negotiating setting. It led to the UNEP's establishment and, indirectly, to many countries creating Ministries of the Environment (Sayer, 1995, p. 5). Much conservation legislation dates from this period, with many protected areas established, while conservation agencies and international organizations actively promoted conservation programs (Sayer, 1995, p. 4).

In 1992, the Ecuadorian National Institute for Forests, Nature, and Wildlife (INEFAN) was created to promote and execute policies related to the conservation, promotion, protection, research, management, industrialization, and commercialization of forestry resources (Registro Oficial No. 27, 1992). In 1999, it was merged into the Ministry of Environment.

As shown in Appendix B, for instance, in the province of Pichincha, the province where our case study area is located, the big majority of Protected Areas (PA) and Protective Forests and Vegetation areas (PF) (85%) were created between 1981 and 2000. The first Protected Area was created in 1966. Only a few areas were declared after 2001. Beside the National Protected areas (56) that constitute the national system of protected areas; there are more than 202 Protective Forests and Vegetation Areas (PF) in Ecuador, a subsystem that cover an area of 2425,002.9 ha, which represents 9.72% of the national territory. These areas are distributed as: State owned with 41%, mixed property (state and private) with 10%, private property that represents 48%, and community property with 1%. Most of these protective forests were created as a result of private and community effort, as in the case of the Mindo Nambillo Protected Forest created in 1988 (see Section 3.2).

By 1998, Sierra and Stallings (1998) show that 70% of the area deforested in western Ecuador was caused by commercial logging. Although the on-farm deforestation that followed the process of land distribution during the agrarian reform period was gradual, it was the ambitious road construction of the 1970s that probably had the most significant and immediate impact on the clearing of the frontier, followed later by the clearing of the remaining forest fragments (Wunder, 2000). Further, agricultural expansion came at the expense of the environment: environmental degradation, including soil erosion, loss of fertile land, and contamination of water sources was high (Gondard and Mazurek, 2001; Vos, 1988, p. 21). However, no conscience about it existed, at least in the political discourse, until the end of the 1990s, as we show in the next Sections.

3.1.4. Forest conservation incentives–payment for ecosystems services and program of environmental restoration vs. Neo-extractivism

From the end of the 1990s through 2007, Ecuador experienced intense political and economic instability. Between 1998 and 2007, there were a total of eight presidents. This ungovernability along with a deep financial and economic crisis led, in 2000, to the dollarization of the economy and massive emigration to Europe and the United States (Caria and Domínguez, 2016). According to estimates for the 1970–2020 period, due to this instability, around 2000 the FDI net capital inflow decreased to below zero (see Fig. 3).

At the same time, the environmental public expenditure also shows a sharp drop during the economic-financial crisis that the country experienced between 1998 and 1999; this was followed by a strong recovery after the dollarization of the Ecuadorian economy (UN-CEPAL, 2005) (see Fig. 4).

Amid this crisis, Rafael Correa, a charismatic economist with training in Belgium and a Ph.D. from the University of Illinois, briefly served as finance minister in 2005 before founding, in 2006, a new left-wing party, the Movimiento Alianza País. He was subsequently elected president, taking office in 2007 ((Dávalos, 2014) cited in (Caria and Domínguez, 2016)). Correa quickly called for extensive constitutional reforms. The new constitution guaranteed a series of rights to communities and indigenous nationalities but also referred to some indigenous and philosophical concepts like good living (*sumak kawsay)* and Mother Earth rights (pachamama) (Asamblea Constituyente, 2008). As stated in the Ecuadorian Constitution, this well-being can only be achieved by respecting the right to live in a healthy environment that is ecologically balanced and by constructing a solidary economic system (Asamblea Constituyente, 2008). This new constitution of Ecuador is revered as the world's first eco-constitution. However, it is also stated that the new constitution vastly increased the power of the executive branch, as several clauses of the constitution contain strategic exceptions whereby certain natural resources are considered to be key strategic resources of the state if for the sake of further developing the nation (Dosh and Kligerman, 2009).

Then, in 2009, the Secretaría Nacional de Planificación y Desarrollo (SENPLADES) presented the "Plan Nacional del Buen Vivir," which addresses food sovereignty and had the specific goal of reducing deforestation rates by 30% by 2013 (SENPLADES, 2009). The plan also includes specific policies to protect biodiversity and water sources as well as to promote the adaptation to – and mitigation of – climate change.

Internationally, since the 1992 Earth Summit in Rio, forests have gained a prominent place on the international agenda of global environmental problems (Wunder, 2000). The Millennium Ecosystem Assessment contributed additional significance to the ecosystem services concept, putting it on the international policy agenda (Fisher et al. 2009. p. 643); cited in Gómez-Baggethun et al. 2010; Pascual and Corbera, 2011). In the 1990s, Latin American countries started to experiment with direct payment for ecosystem service approaches. For Ecuador, local experience with the creation of a community conservation area in 2007 (de Koning et al., 2011) and examples of national schemes for conservation payments in other countries, such as Costa Rica and Mexico, formed the basis to start designing what is now known as the Socio Bosque (SB) program in 2008; see (de Koning et al., 2011).

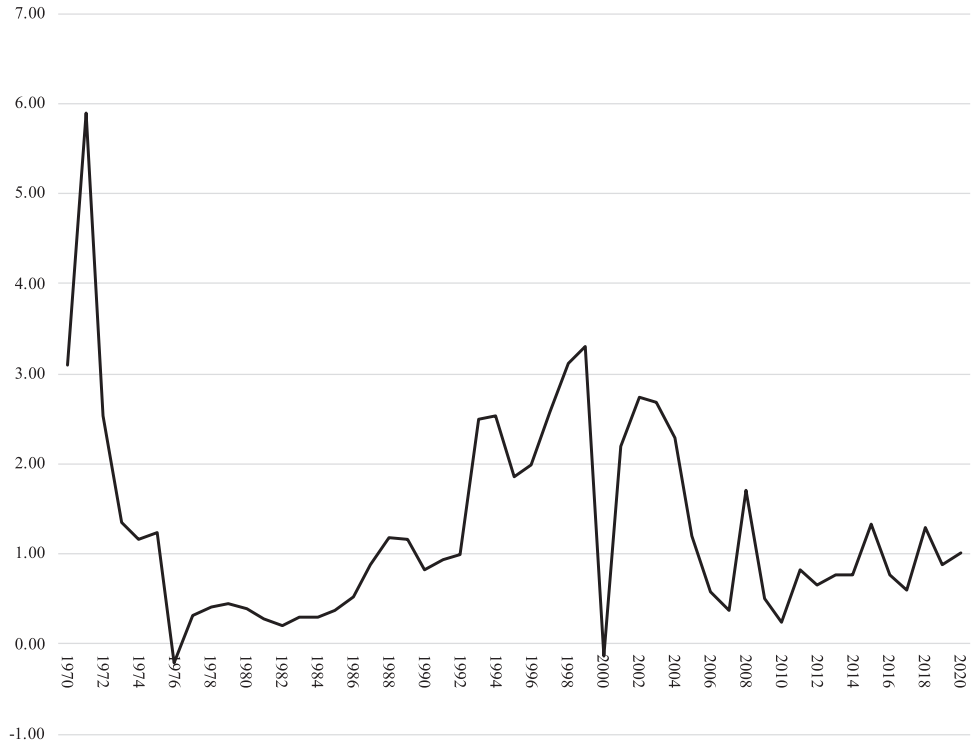

Fig. 3. Foreign direct investment (FDI), net capital inflow (% of GDP) – Ecuador.
Source: World Bank, 2020.

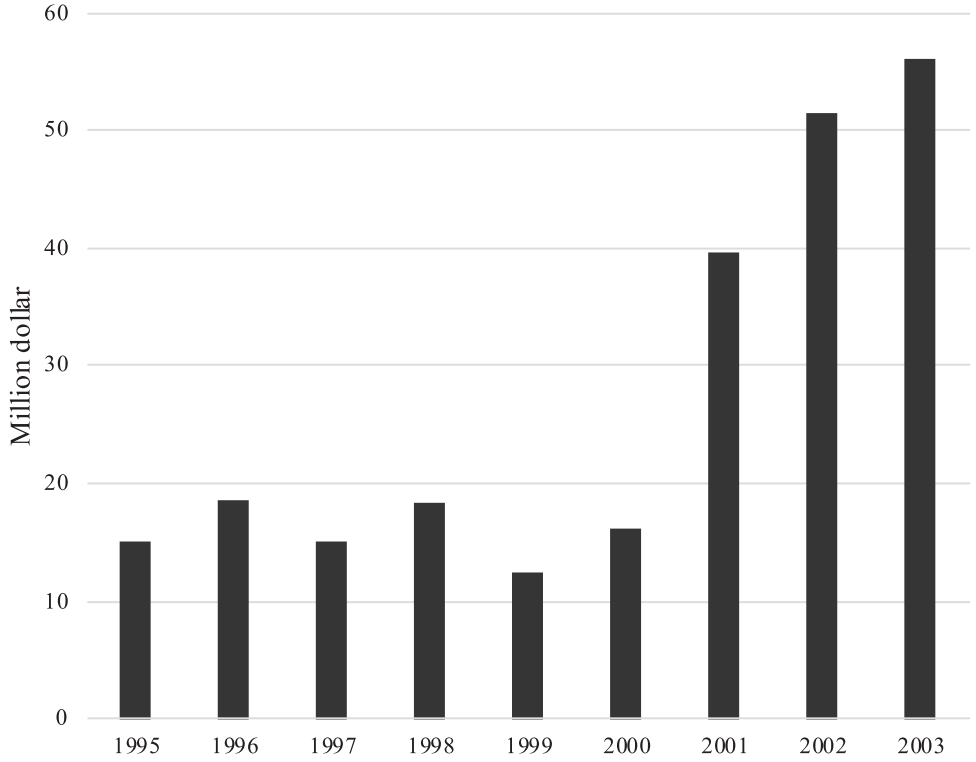

Fig. 4. National Environmental Public Expenditure.
Source: UN-CEPAL, 2005 based on data from the Ecuadorian Ministry of Finances.

Socio Bosque is part of Ecuador's national pre-REDD+ strategy (UN-REDD 2015). In Ecuador, the design and political acceptance of the SB program, a national conservation agreement scheme of the government of Ecuador, at all levels of the government, was relatively fast (de Koning et al., 2011). SB consists of a system of incentives, including the transfer of a direct monetary payment per hectare of native forest to individual landowners as well as local and indigenous communities that conserve and protect forest in relevant areas for conservation, through voluntary conservation agreements (MAE, 2013). For the first 50 ha of the conservation area, the incentive is US$ 30 per hectare per year, from ha 51–100, the incentive decreases to US$ 20 per hectare per year and decreases further to US$10 for additional ha between 101 and 500. Monitoring the socio-economic impacts of the program is done through analysis of the social investment plans (MAE, 2013).

Criticisms of the program include: poor people may not have a title of their land and this may create an obstacle to direct participation, while holding little land implies that it is hard to set aside any for conservation. De Koning (2011, p. 538) suggests that a second reason for declining rates of application to Socio Bosque could be that the incentive's current levels are uncompetitive in areas where alternative land uses can generate high revenues. Additionally, various indigenous communities and civil society organizations have been, and continue to be, ardently opposed to REDD+ (Reed, 2011). As discussed in Reed (2011), indigenous groups have long considered themselves to be the principal victims of capitalist, neoliberal, and market policies, which often resulted in negative environmental consequences for their territories, health, and livelihoods. In July 2009, MAE extended the SB Program to include páramos through the creation of Socio Páramo (SP) (de Koning et al., 2011). With its REDD+ readiness capacities, Ecuador is positioned to implement its REDD+ Action Plan (UN-REDD, 2016). As of 2021, Socio Bosque has enrolled more than 1.6 million hectares of land through 2681 contracts, including 174,971 beneficiaries, covering 1616, 263.63 ha of conservation area, around 5.4% of Ecuador's territory (MAE, 2021). However, in 2015, after the collapse in global crude oil prices and a deep economic recession,[1] payment to all program beneficiaries was suspended and new submissions closed for at least two years as reported in (Etchart et al., 2020).

Moreover, during this period, the National Strategy on Climate Change 2012–2025 was envisioned, a comprehensive governmental effort to define climate change action responsibilities and structures at the national level (MAE, 2012). The National Biodiversity Strategy 2015–2030 envisions actions in line with Aichi biodiversity targets, as committed to by the Ecuadorian government in the Convention on Biological Diversity (CBD), which Ecuador ratified in 1993 (MAE, 2016). As stated in the National Good Living Plan (PNBV) and ratified in the National Biodiversity Strategy, governmental strategies seek to develop strategies that progressively abandon the economy that is dependent on the extraction of non-renewable resources and raw material exportation to give way to a diversified, eco-efficient, inclusive, and high value-added economy.

Since 2020 the Green Climate Fund (GCF) granted USD 18,571,766 to the "FP110 Ecuador REDD-plus Ecuador REDD-plus RBP for results period 2014" program. This program acknowledges Ecuador's RED-D+ 2014 results - a total volume of 4831,679 tons of carbon dioxide equivalent (tCO2eq) in emissions reductions (UNDP, 2019). Approved in 2019, the project aims for a 2026 completion. Key areas of support include the development of policies and institutional management for REDD+ ; the transition to sustainable agricultural production systems; sustainable forest management, conservation and restoration; and the management of a national REDD+ action plan (UNDP, 2019).

[1] Oil prices rose from 19.19 US dollars in 2001–93.81 US dollars in 2011, providing the highest revenues in history; however, in 2015, total exports fell by 39%, dragged down by a fall of 50% in petroleum exports, mainly due to the fall in oil prices (Villalba-Eguiluz et al., 2017).

At the same time, the 2010s were marked by a (neo-)extractivist (large scale natural resource extraction) development, mainly due to the demand for raw materials proceeding from Asia (Lalander, 2014). Hence, it is stated that the inclusion of good living concepts and mother earth rights was more rhetorical than operative, with inconsistencies found in the Ecuadorian regulatory framework concerning the recognition of these rights; see (Farah and Vasapollo, 2011; Radcliffe, 2012; Albuja and Dávalos, 2013; Lalander, 2014; Caria and Domínguez, 2016; Villalba-Eguiluz and Etxano, 2017). In other words, economic and political interests are becoming increasingly incompatible with indigenous and environmental rights. Complex processes of transformation are taking place due to industrial mineral extraction in several protected areas and indigenous territories in Ecuador (Avci and Fernández-Salvador, 2016; Van Teijlingen, 2016; Vela-Almeida et al., 2018; Valladares and Boelens, 2019; Leifsen, 2020). Mining is the economic activity attracting the most foreign capital to Ecuador: in 2018, the mining sector captured 58% of the FDI (see Fig. 5). Foreign Direct Investment (FDI) statistics show that investment in mining has generated an important contribution to the inflow of FDI.

According to the Central Bank of Ecuador (BCE), between January and November 2020, mining exports reached a value of USD 810 million, reflecting a growth of 206% compared to the same period in 2019. It is expected that the mining sector's share of the country's total exports will increase considerably in the 2020s as production ramps up at Fruta del Norte and Mirador, two large scale gold, silver, and copper mines, (BCE, 2021).

3.2. *Historical institutional changes in the Mindo parish and western foothills of Pichincha, Ecuador*[2]

This section seeks to understand how historical/institutional changes are perceived and narrated by the people who lived these changes in northwestern Pichincha.

3.2.1. *Colonial institutions–hacienda feudal system*

During the first 20 years of transition from feudal modes of production to 'capitalist' production, in the study area, it was common to see a type of contract system under which the owners of the haciendas rented land to the 'campesinos' (peasants) who were originally the workers of these haciendas but did not possess title to the land. In exchange, the campesino would give a portion – usually one-third – of their production to the landowner. Between the 1920s and 1950s, large landowners in this area devoted their large land estates (haciendas) principally to cattle grazing. They also raised some crops, including cassava, guayaba, lemon, and green banana, among others, mainly for self-consumption; sugar cane and maize were commercialized.

3.2.2. *Agrarian reform–law, and perception*

The agrarian reforms of the 1960s and 70s were perceived as an attempt at capitalistic modernization, ignorant of regeneration needs and of management of soil, forest, and water resources, which led to an irremediable loss of nature and valuable resources. Given the pressure of the Agrarian Reform, many landowners had to invest in cattle. They were somehow forced to expand their stockbreeding activities to secure the property of their lands because of the "*pressure of the agrarian reform.*" Participants of this study used terms like *"the terrible agrarian reform"* (Raw data interview 1, translated by the author) or "*the 'damned law' of the IERAC"* to describe the Agrarian Reform Law because*, "the people who destroyed more nature were the people who were granted the property rights to the land"* (Raw data interview 26, translated by the author). Showing agricultural productivity was a requirement to be granted title to the land under the land redistribution project. However, others say that some areas were cleared several decades before the first

[2] This section is partially based on Coral et al., 2020

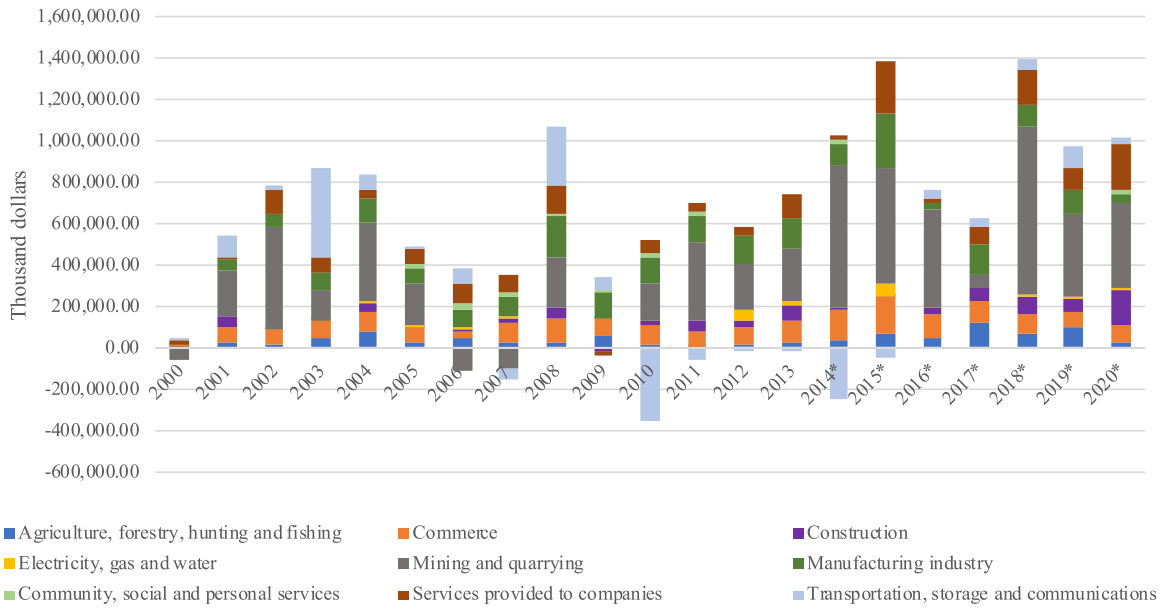

Fig. 5. Foreign Direct Investment per Sector, 2000–2020. * data subject to revision. Elaborated by the author based on databases of BCE-SIGADE, Statistics Foreign Direct Investment per sector, Agency for the Regulation and Control of Hydrocarbons (ARCH), Ministry of Energy and Non-Renewable Natural Resources (MERNNR) and Superintendency of Companies, Securities and Insurance.

Agrarian Reform.

Several landowners, the sons and daughters of people who worked as loggers in the area, said that their parents and grandparents in the 1950s and 60s started to 1) cut down the trees of haciendas, farms that sold them the wood near the valley, near the center; then, later, 2) they accessed the higher lands along the rivers, throughout the Saloya, the Cinto, and Nambillo; 3) in the process, they found a place to settle; 4) they started to make pastures on the cleared lands, to crop and to convert the land into a farm. They took possession of the place because they stayed there and worked the land; and 5) much later, in the 1970s, several years after settlement, according to the IERAC law, the land was granted to the people who cultivated 50% of it. Consequently, many natives and migrants "*took*" farms and "*vacant land*" that was located in less accessible places, while the lands near town generally remained in the hands of big landowners of the area (see Fig. 6).

Many of the people who received their land during the Agrarian Reform subsequently sold it (see Fig. 6). Some of the reasons why the land was sold include "*steep slopes*" and "*very difficult access at that time.*" According to the interviewees, the cultivation of crops and cattle production was very difficult because there was no access to the land during the rainy season due to heavy rains: no roads or bridges existed until the 1960s. In the past, most participants had a garden – even a coffee field – as well as some pasture. However, higher production, other than self-consumption, was difficult due to "*high humidity many products don't grow well,*" "*the soil is not fertile because the nutrients are washed due to the high slopes and heavy rains*" (soil quality), and "*there are many predatory animals,*" as stated by the participants. Additionally, according to the participants, cattle production was very poorly managed, as there was only limited knowledge about raising cattle and no technical assistance or support for the farmers. The only technical assistance programmed

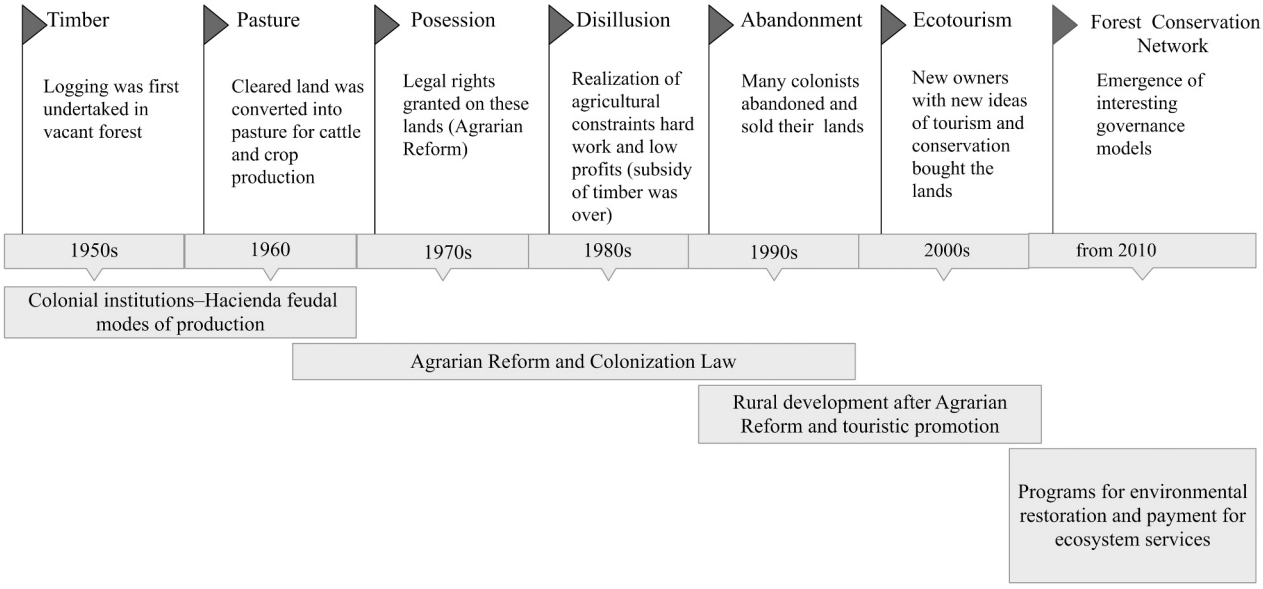

Fig. 6. Process of land conversion in the Mindo and western foothills of Pichincha volcano area, based on narratives.

recalled in the area was a project of the provincial council aimed at increasing naranjilla fruit (*Solanum quitoense*) cultivation; for this, the use of a considerable number of agrochemicals was promoted, as participants narrate.

Still, other issues were problematic, including low prices for the producers. They stated that, "*for the consumers, it is cheaper to buy products from other areas.*" Further, land tenure conflicts were reported: for instance, lawsuits for land possession, since many of the 'barren lands' actually or allegedly had previous owners or people settled there, by means of customary land tenure. As stated by the participants, many people occupied or 'invaded' lands and then sold those lands. In the end, there were many conflicts as, in many cases, several people claimed possession of the same land. Often used by politicians as a political platform to gain votes, some people received land because they had contacts in the governmental agencies in charge of the reforms, as reported by some participants. After these agricultural experiences, as land prices rose after the eco-tourism boom, many landowners ended up selling their lands or changing their economic activity.

3.2.3. Incentives for conservation–law, and perceptions

A conservation movement emerged from the collective action of a group of carpenters and committed citizens at the end of the 1980s (see Coral et al. 2020). The concept evolved as the idea was reinforced by several native people, biologists, new owners in the area, naturalists, university students, and local NGOs. In 1988, this community of citizens sent a proposal to the National Forest Division seeking to protect around 19,200 ha of forest, along with the construction of an Interpretation Center that would be financed by an international NGO. As participants in Mindo recall, a small group of people fought against the loggers' economic interests. Thus, the question arose, what will they do next to finance the conservation activities? From the idea of conservation came the idea of ecotourism, but opinions are divided regarding whether the change is positive.

Many hacienda workers also worked in the timber industry as carpenters or loggers. It is clearly stated by these participants and their descendants that there is resentment toward the "hacendados," the tourism industry in general, and the actors who started the conservation movement in the area because they "*started to prohibit everything.*" According to these older members of the community, they were affected in four ways: a) They rented land to produce, paying the owner of the land with products; however, as the old hacienda modes of production dissolved in the 1970s, land was no longer rented to the workers; b) They used to hunt wild animals and to fish, but after the conservation movement was initiated in the area, hunting and fishing was prohibited; c) Nowadays, they no longer grow crops, with the tourism boom and conservation wave, as there was a "*demonization*" of agriculture and exclusion; and d) There is no longer access to land, "*the one that has money buys the land and we that don't have, we have to observe what the others buy and nothing else,*" "*there is no free land anymore,*" and "*people have to buy it expensive*" (high land prices). Some of these people, ex-workers of the big haciendas of the area, do not possess land and could not keep pace with developments; in this case, tourism, although in other cases, a generational change is indeed seen, see (Coral et al., 2020).

Through the beginning of 2020, before the corona crisis, tourism was increasing thanks to promotion by the Ministry of Tourism. Additionally, training courses on ecotourism and sustainability were organized by the Ministry of Tourism, the Provincial Government, the Parish Board, and SECAP (Ecuadorian Service of Professional Training). Non-governmental organizations offer workshops on, among others, waste management, forest management, soil management, organic farming, and forestry with native species. As participants recall, in the past, in Mindo, the local school and institute offered Bachelor's in carpentry and mechanics because the main activity was logging and the related timber commercialization. It is now different: Bachelor's degrees are offered in agritourism, adventure tourism, and ecotourism.

3.2.4. Programs for environmental restoration and payment for ecosystem services (PES)

In 2012, the Socio Bosque Program of Payment for Ecosystem Services (PES) was introduced in this area. According to interview data, the program is associated with governmental control. It is not seen as a main income solution; rather, it is seen as extra income with the main income secured from other economic activities. However, those landowners who would have reforested their lands regardless appreciate the incentives to keep doing so. However, payment delays are reported; see selected testimonies in Appendix A.

According to the participants, in addition to the Socio Bosque program, another program including a component of ecological restoration is the National Program of Forestry Incentives. This program is implemented by the Environment Ministry jointly with the decentralized autonomous governments at the parish level. However, as experts in the program state, reforestation efforts in the area are mostly private and the application of the Program of Forestry Incentives was not really welcomed, especially since the incentives are very low. After their fourth year of participation in the program, the National Program of Forestry Incentives' beneficiaries can join the Socio Bosque program, if they want. Additionally, another project on reforestation for commercial purposes was implemented by the Ministry of Agriculture (MAGAP). Other regulations mentioned by the participants include those related to the Mindo Development and Spatial Plan 2012–2025, as elaborated by the decentralized autonomous government at the parish level. However, as some participants state, the plan is not fully implemented due to political "unwillingness." Further, municipal ordinances and norms related to noise, construction, hunting, waste management, and urbanization are well known and followed.

Within this territory, several conservation initiatives originate from private, governmental, and non-governmental organizations that work to create a regional sustainability model, focusing on activities like organic agriculture, ecotourism, sustainable cattle production, and good land-use practices. For instance, in the region, there are many municipal areas of conservation, protected forests, an eco-route, and a biological corridor for the spectacled bear, one of the endangered native species. Some areas have been declared "Areas de Conservación y Uso Sostenible" (areas of conservation and sustainable use); for instance, the so-called "Camino del Yumbo" (Yumbo track) (personal communication with a local leader and landowner, interview 21, cited in (Coral et al., 2020)). Our study shows that, in this territory, there are more than 20 protected forests, mainly private efforts that constitute a real conservation network, whose origins and transformations are narrated in (Coral et al., 2020). However, challenges remain, including, "there are groups that want a different tourism" and "bureaucracy issues," that hinder the implementation of conservation projects, as well as "opposing visions of what development should be," as participants said (cited in Coral et al., 2020).

4. Discussion

When analyzing the data obtained from this study, our first discussion point is the observation that land reforms and institutions are often embedded in global processes and often come in historical waves, leading to an individual change in meaning and to generational changes, as well as changes in land-use. Fig. 7 shows how the summary of the drivers of land-use change identified in the Mindo and western foothills of Pichincha volcano (see Coral et al., 2020) coincide with processes happening at several levels, as narrated in our reconstruction of institutional changes related to land in Ecuador. External factors, many of them institutional/historical factors from the international/global level, can affect decisions at the individual or family level. As an illustration, the victory of the Cuban revolution and Cuban agrarian reform was mentioned as a factor that gave impetus to the first Ecuadorian agrarian reform. In fact, as documented in Brassel et al. (2008, p. 17), in the 1960s, the growth of the indigenous and peasant movements, the

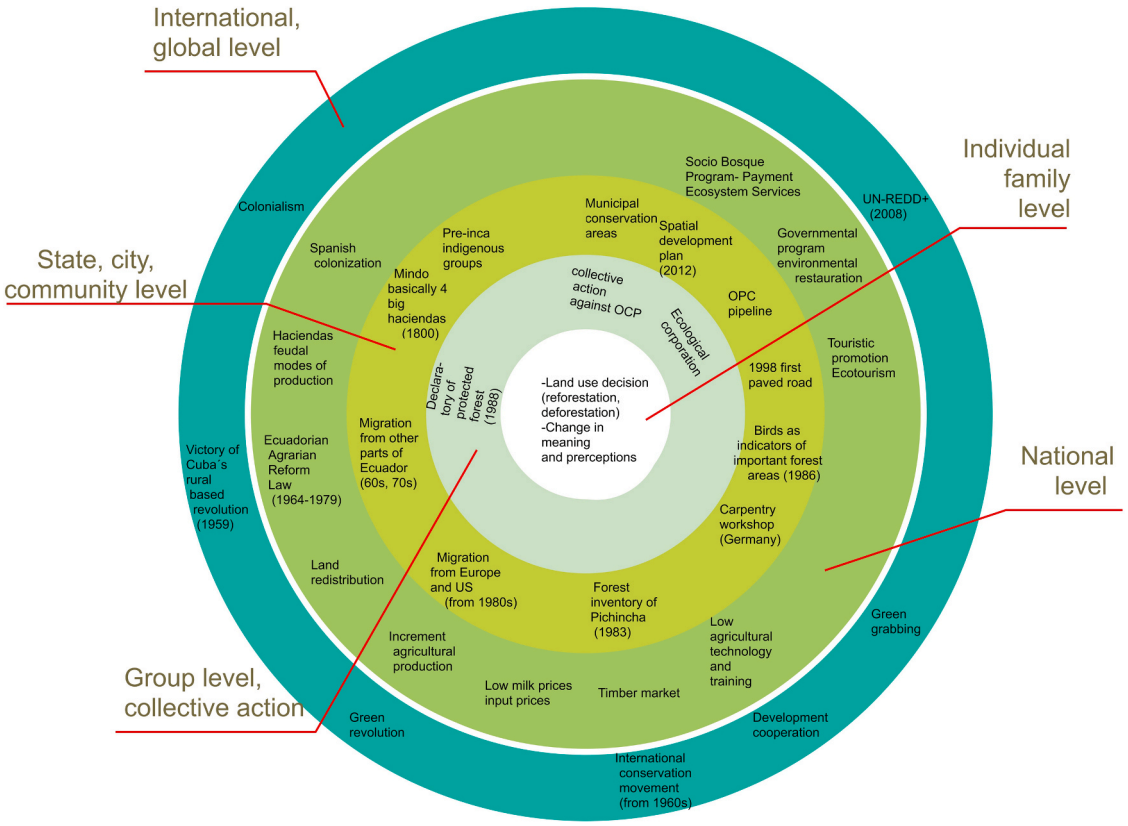

Fig. 7. Summary of historical-contextual conditions externalized by participants of the study.
Source: (Coral et al., 2020), based on grounded theory data.

attempts of agricultural modernization by the landowners, and the political influence of the Cuban revolution and Cuban agrarian reform caused the Ecuadorian government to consider reforming the existing agrarian system.

This reform influenced land-use decisions in the area. As narrated by hacienda owners, they were forced to expand their stockbreeding activities to secure the property of their lands, because of the "pressure of the agrarian reform."

As stated in Becker (2008), social movements never develop in isolation or in a vacuum. Bhattacharya et al. (2019, p. 19) observed, globally, one of the key waves in land reform happened in the post-war period between 1945 and 1975; this period saw 158 reforms – with 95 implemented from 1960 to 1975.

Furthermore, we observe that the legislative changes happening from 2000 on, such as schemes of payment for ecosystem services and "conservation movement" were embedded in an international conservation wave that started in the 1970s but arrived relatively late to Ecuador, as a social revolution came first. Since the 1992 Earth Summit in Rio, forests have gained a prominent place on the international agenda of global environmental problems; however, little has been achieved on the ground as the trend of tropical deforestation has continued (Wunder, 2000, p. 1). This is because this embeddedness in global processes does not always reflect the needs of the local system.

Since expertise is often limited, information frequently scarce, and time pressure exists for making decisions, the copying of already established institutions that worked in other settings, without further adaptation at the local level, happens frequently. Transplanting institutions into different cultural and geographical contexts might lead to ill-conceived land reforms. Participants of this study stated that, up to some point, the agrarian reforms of the 1960s and 1970s failed in the study area because they did not consider the biophysical characteristics of the land. The reforms sought agricultural expansion on lands where the soil conditions, slope, and humidity are not suitable for intensive agricultural production. Further, according to the participants, cattle production was very poorly managed, as farmers had limited knowledge about raising cattle and no technical assistance or support. In fact, as Becker (2008) reports, the Institute in charge of the reforms (IERAC) provided farmers neither training nor financing, thus resulting in poor administration of cooperatives. In 1994, a new law officially derogated the Agrarian Reform legislation since it resulted in little gain for indigenous people and smallholder farmers. As analyzed in Section 3.1, the lack of an enabling political environment and bureaucracy resulted in an agrarian reform that largely reflected landowning elite interests (Goodwin, 2017). Cross-national evidence on land reform enactments (1900–2010) shows that unsuccessful initiatives were quickly repealed or became dysfunctional a few years later, following political struggles (Bhattacharya et al., 2019). However, in other cases, the main problems were left unresolved after years of attempts at innovation. For instance, Caldarice and Cozzolino (2019), exploring reforms to urban facility planning in Italy, conclude that friction and contradictions are mostly between legal and practical needs. Further, they observe contradictions related to the presence of old technocratic prescriptions about quantitative urban standards, As they note, in the current planning debate there is less interest in quantifiable needs and an increasing push for quality, making exclusively quantitative urban welfare policies inadequate. Likewise, as observed in our case study, Ecuador's policy decisions are not always based on grounded knowledge. For instance, the inclusion of Buen Vivir or Sumak Kawsay (good living) in the Ecuadorian constitution was first seen as a sign of how to incorporate indigenous beliefs into the global institutional setting. Subsequently, in 2008, the same constitution formed the basis to start designing what is now known as the Socio Bosque Program of Payment for Ecosystem Services (PES). However, as Gómez-Baggethun et al. (2010) conclude, the focus on monetary valuation and payment schemes has contributed

to attracting political support for conservation, but also to commodifying a growing number of ecosystem services while reproducing the neoclassical economics paradigm linked to the market logic to tackle environmental problems. As stated in Redd (2011, p. 527), "in any case, it must be recognized that indigenous communities are once more being asked to buy into an idea handed to them –from above. By doing so, many of them would enter a realm of modern, global, and western society that values their forests for different reasons than their own." As narrated by this study's participants, the SB program introduced in this area is highly associated with governmental control and it is not seen as a main income solution, rather it is seen as additional income when the main income is secured from other economic activities. However, those who would have reforested their lands regardless appreciate the incentives to keep doing so. In fact, as narrated in Section 3.2.3. the community of the Mindo area initiated a process of forest conservation in this area several decades before Socio Bosque was introduced.

Similarly, López-Sandoval and Maldonado (2019) analyzed páramos under communal tenure in the northern Ecuadorian Andes and show the unwillingness of the community to get a legal status Socio Paramo, which reflects their political conviction that the outcomes of current collective paramo management should remain solely with the community. Furthermore, Alvarado (2019) shows that among the Siona communities living in the Cuyabeno area (one of the first protected areas created in the Ecuadorian Amazon region), the yagé ideology is intrinsically connected and inseparable from the tropical rainforest, hence any notion of nature as being separated from humans is non-existent. Nevertheless, new institutions have been created to determine how the resources are to be managed inside the reserve, but the Siona have had little say in this process (Alvarado, 2019). This process is seen as an introduction of a capitalist ideology, accompanied by conservationism (Alvarado, 2019). Given that this land was previously managed as commons by local indigenous groups, the establishment of protected areas has had numerous consequences, including land grabbing processes and "institution shopping from below" (e.g., powerful actors selecting institutions strategically) (Alvarado, 2019).

Weyland (2008) observes institutional changes and concludes that adjustments and modifications are often minor. However, this insufficiency of adaptation over time increases the problem load on the existing institutional framework; hence, these unresolved difficulties might push relevant actors into the domain of losses, eventually inducing them to accept significant risks and bringing about meaningful transformations (Weyland, 2008). For instance, in the study area, timber merchants in the Mindo area realized their subsistence, the valuable timber, would disappear in a couple of years, leaving them without a way to make a living, this resulted in an ecological movement, which achieved the declaration of 19,200 ha of protected forest. At the national level, if we look at the structure of the system in Ecuador, the cacao in 1940, the banana in 1948 and 1972, and the subsequent oil export booms were succeeded by structural crises that demonstrated the fragility of the economic system (based on a growth model) and regulations (Larrea, 2006, p. 39). As suggested in Larrea (2006, p. 39), these structural crises show the limited sustainability of monocultures, which are characterized by the intensive employment of agrochemicals. This knowledge, observed though history, is valuable for shaping future narratives. Because, in reality, due to the complex dynamics of time and space, along with interconnections between the elements of the land system, including very specific cultural settings and bio-characteristics of the land, the set of land uses is limited, just like the institutional arrangements.

Regarding the question of how change happens and the sources of institutional change, Farrell and Shalizi (2012) observe that the explanation of change should first examine how variation occurs such that objects with observable and interesting differences are produced through some process. It must then explain not just how selection occurs – meaning how some principle operates to select certain variations and not others – but also how variations that have been selected are reproduced preferentially.

In this paper, we observe that generational changes and changes in meaning occur not only at the individual and generational levels but are also reflected in the previously introduced historical institutional changes at national and global levels. It is interesting to see the change in vision and efforts: as observed by a participant, "*30 or 40 years ago, private and governmental efforts were directed at making pastures thrive and expand. Now we are talking about a reverse process, what is now expanding is the forest*." In this study we observe that during the agrarian reform period, the forest had virtually no legal or economic value and that agricultural productivity was a priority. Lately, in the next historical phase marked by PES programs, the economic value of the forest is increased along with its meaning and appreciation. Similarly, Dacin et al. (2002) observe that some rules are not simply regulatory systems but also cultural–cognitive frameworks that define actors' nature, interests, and rights.

As stated by Giddens, institutions are not only represented in the cognition of individuals, but also in socially manifested rules, routines, resources, as well as in symbols like myths, stories, and narratives (Giddens, 1984 cited in Stein, 1997). Rules are regarded as socially or culturally transmitted dispositions, with actual or potential normative content, with some rules concerning commonly accepted tokens or meanings (Hodgson, 2006. pp. 4–5). The result is a set of assumptions based on information from the social context; however, due to the human bounded capacity to process information, we have difficulty in handling too many radical changes in our thought structure; hence cognitive inertia is observed in adapting to changes in the surrounding world, including institutional changes (Stein, 1997). Other approaches suggest that what we call 'culture' (values, beliefs, and social norms) can be classified as a slow-moving institution (Roland, 2008). The evolution of culture is closely related to the evolution of technology and scientific knowledge, which might play a key role in understanding growth (Roland, 2008, p. 135). Since institutions are a mental construct, changes also imply learning and unlearning; thus, generational changes are reflected in changes in meaning (Coral et al., 2020).

Coral et al. (2020) observe that a relevant component in the aggregation process between the individual cognitive system and a social system or social perspective is so-called "common knowledge," as people share a common knowledge, the product of certain socialization. The term "socially transmitted" implies that the replication of rules depends on a developed social culture and language use. In the study area, this common knowledge has undergone extreme changes since the 1990s – for instance, the ecological consciousness. Likewise, López Sandoval and Maldonado (2019) study the evolution of communal governance in páramo areas, finding that environmental knowledge about the relationship between water and páramo boosted institutional change and rule development. As they conclude, the control of land-use changes and grazing result from a long-term environmental and cultural/political evolution (López-Sandoval and Maldonado, 2019). In theory, cultural systems link decision-making processes with transmission to create a system for the inheritance of acquired variation (Richerson and Boyd, 2001, p.4). However, as suggested by Durham (1991) (theory of cultural coevolution), a process of cultural selection, or preservation by preference, driven chiefly by choice or imposition depending on the circumstances, is the main, but not exclusive, force underlying cultural change, hence culture can be, but is not always, strong enough to modify institutions (Durham, 1991).

In the literature, cognitive diversity is discussed as an important factor driving change; for instance, Page (2001) and others suggest that greater cognitive diversity increases the chances that individuals who encounter and interact with others with different ideas and perceptions can identify possibilities of action that might otherwise never had emerged. As new concepts emerge, knowledge of the system emerges, allowing reforms, innovation, and new practices and trends to emerge as well (Coral et al., 2020). This is shown in our case study, as in the small town, discussions among the carpenters and villagers created the room

for new possibilities regarding the sustainable timber exploitation in the study area. In Mindo, the conservation movement emerged from the collective action of a group of carpenters and committed citizens at the end of the 1980s. The concept evolved as the idea was reinforced by several native people, biologists, new owners in the area, naturalists, university students, and local NGOs resulting in the formal protection of the Mindo Nambillo Protected Forest.

As Weyland (2008) discuss, another important source of institutional change is distributional issues and power constellations. For instance, an analysis of changes in the Bulgarian land law shows that the institutional changes reflect shifts in the relative bargaining power and the interest of the relevant actors in charge as a result of an urge for system change in Central and Eastern European countries (Hanisch and Schlueter, 1999). The revision of 372 major land reform enactments in 165 countries between 1900 and 2010 shows that a shift in the executive's political ideology can yield pressure for or against land reform. Other reforms may take several years or decades to enact, require several complementary bills to be passed, then may be instantly reversed when the power balance changes (Bhattacharya et al., 2019). As shown in this study and claimed in Héritier (2017), a discrepancy between the designing actors of an institutional rule and those affected by the rule in society at large may constitute an important source of institutional change. For instance, the many years of indigenous resistance and events that happened as a transition between colonial institutions and the first Agrarian Reform represent a significant source of institutional change. As observed by Dacin et al. (2002), new mechanisms result from changes in power alignments that de-legitimate existing forms and bring to the fore new cultural-cognitive conceptions. These conceptions provide a strong foundation for new policies, new legal mechanisms, and new normative frameworks (Dacin et al. 2002). In other words, one important source of change is the shifts in the balance of power. Giddens's conceptualization of agency does not afford individuals the ability to undo the history of structure but does indeed recognize their capacity to significantly change the conditions by which structure is recursively implicated (Giddens, 1984). By rejecting a totalizing view of authority, agents are always in a position to either perpetuate the (re)creation of social structures or to attempt to consciously alter them (Canary and Tarin, 2017). The Ecuadorian agrarian reforms of the 1960s and 1970s struggled to be realized until the point when the actors took risks, as indignation reached the point where they had nothing more to lose. As Becker (2008) states, during the indigenous movements of the 1930s, indigenous women were actively involved, often pressing their husbands to act. These women were not young and unattached; on the contrary, they were mothers and grandmothers with deep roots in the community, having seen their ancestors suffer abuses from the hacendados, and now they risked facing imprisonment and eviction. However, precisely for this reason, they fought for their rights because they had everything to gain (Becker, 2008, p. 61). The same following the declaration of 19,200 ha of protected forest in the Mindo area, as timber merchants realized their subsistence, the valuable timber would disappear in a couple of years, leaving them without a way to make a living. It shows the possibility of individuals to bring about processes of change. Additionally, research on developing countries highlights that western practices are often coercively imposed on countries by international organizations (Campbell, 2010). For example, as narrated in Section 3.1.3., large-scale land ownership, irrigation, improved seeds, fertilizers, pesticides, machinery, and a low-wage paid labor force marked the pace of the agrarian development in the 1980s and 1990s, in cooperation with the United States Department of Agriculture (USDA), the Organization of American States (through the Punta del Este Conference), and other organizations like the FAO (IERAC, 1965; Handelman, 1980; Cuvi, 2009; Carrillo, 2016). During the same period, study area participants reported a governmental project aimed at intensifying the production of naranjilla (*Solanum quitoense*) accompanied by the promotion of agrochemicals; however, as we observed in the narratives, the suitability of these lands was quite poor and the programs were unsuccessful.

Regarding the system's capacity to reorganize, persist, and reproduce, Richard Nelson claims that the process of change does not just occur through "blind" genetic replication. Human agents intentionally design social institutions (Lewis and Steinmo, 2012), while social systems are constitutively and perpetually (re)created through discourse and meaning (Structuration Theory) (Giddens, 1984). Hodgson (1996) states that institutions evolve over time either by deliberate design or spontaneously, constrained by both context and path dependencies. This means that their structure, rules, and objectives reflect past conditions, reveal the process of adaptation over time, and constrain the range of options available to actors in the future (cited in Rammel et al., 2007). To understand processes of structural change, one must include one or more of the underlying "exogenous" sets of variables: (a) the biophysical world; (b) the broader community of the participants themselves; and (c) the rules-in-use, which are nested within a larger system that may modify itself over time (Ostrom, 2008). Hanisch and Schlueter (1999) treat the initiation of the system change as an external shock, and the way in which this external shock hits the system is one of those factors determining what is in the pool of available institutions for reform and who is in charge of picking them. However, institutional change does not always come in the form of an exogenous shock or environmental shifts (Mahoney and Thelen, 2009). The internal structure of an institutional arrangement may also result in changes in conditions and reorganization. In this view, institutional change is not only seen as a process of rational design but also develops in a co-evolutionary process, whose emergent properties and ongoing reorganization is inherently difficult to predict. Self-organization here refers to the ability of a system to change its internal structure and function in response to external circumstances. In this view, the re-organization of both designed and self-organized elements creates different outcomes in different contexts. As Norgaard (1994, p. 246) argues, agricultural development is a continuous process, always building on the past, rather than a discontinuous process with implantations of technologies practiced in very different ecosystems. Research shows that "robust" systems maintain desired characteristics despite fluctuations in the behavior of its component parts or its environment. These will typically not perform as efficiently with respect to a chosen (desired) set of criteria as its non-robust counterpart (Anderies et al., 2004). However, the robust system's performance will not drop off as rapidly when confronted with external disturbance or internal stress. In this regard, in the context of land use planning, it seems appropriate to ask, what are the desired characteristics that we want to keep?

Bromley (2006) says that the existing constellation of institutions gives rise to individual behavior. We would rather say it is the other way around: for instance, the many years of indigenous struggles before the agrarian revolution. As rightly perceived by the people, institutional changes reflect a combination of ideas, concepts, and beliefs integrated not just from the global to the local levels, but also from the local to the global as shown by individuals who individually, with little political influence, fight for the conservation of their lands and forest. In this regard, institutional change is the product of changes in ideas held by actors or, in the words of Steinmo (2008, p. 131), "institutional change comes about when powerful actors have the will and ability to change institutions in favor of new ideas." However, what is important for research, is where you put the spotlight: for some, it is crucial to understand institutions in light of their historical evolution, while others attempt to understand human evolution by studying institutions. Regardless, institutional change is not only undertaken in the parliaments and courts, but also in the way people decide to live their everyday lives.

5. Reflections of methodology and significance of the study

Using grounded theory techniques and procedures to construct substantive theory allows us to understand the process and context underlying decision making on land-use in the study area. Furthermore,

the contextual conditions externalized during the interviews show how this approach allows us to link individual action to a higher structure, e.g., global to local and vice-versa. This shows the multi-level nature of institutional change related to land use in Ecuador. Substantive theory is developed for a substantive are of study, which means that it is of practical importance and highly contextualized or, as defined by Kearney (1998), substantive grounded theory is a 'tailor-made' theory, tailored to the data. However, by applying concepts derived from the analysis to other contexts, it has the potential to become a formal theory with broader applicability (Corbin and Strauss, 2015:63). The struggles to transform land institutions narrated in this paper come in global and regional waves. For instance, indigenous communities and peasants in the Latin American region are currently struggling against neo- extractivist practices that threaten those territories that they were asked to protect decades ago. This gave rise to new counter-hegemonic narratives associated with the defense of the rights of humans and nature (see for instance, Eufemia et al., 2019; Smart, 2020; Tetreault, 2020, among others). By employing a historical approach, this study provides a powerful policy research methodology because it allows us to understand long-term changes and build a grounded knowledge of institutional change while also allowing us to identify mechanisms of institutional change. In social sciences, mechanisms represent an intermediary level of analysis between pure description and storytelling, on the one hand, and universal social laws, on the other (Hedström and Swedberg, 1996). Mechanisms are structures formed by social events that change relations between specified sets of elements in identical or closely similar ways over various situations (Tilly and Goodin, 2009, p. 442). Once the main structural factors have been identified, insights can provide a strong foundation for further studies using quantitative measures.

6. Conclusion

Institutions are not just regulatory systems but also cultural-cognitive frameworks that are constituted and related to the constitution of meaning and the flow of human thought. In this view, individual perception merges into a common knowledge within the context of socialization. However, for systems to persist or reproduce themselves, structures must emerge, structures that persist in time, as shown by the many years that indigenous people fought before the Ecuadorian agrarian reform of the 1960s and 70s, triggering land-use change processes, or the collective action of a group of committed citizens who declared 19,200 ha forest to be protected in the Mindo parish and western foothills of Pichincha, Ecuador. To analyze institutional change, we must consider the historical development of these changes and the multi-level nature of institutional change, from the individual or family level, to group level/collective action, state/city/community level, national, and global levels. Based on historical institutional changes in Ecuador, we discuss the extent to which land reforms are embedded in global processes and observe that embeddedness in global processes does not always reflect the local needs. We also discuss theoretical explanations regarding the issue of cognitive variation (cultural-cognitive), power relationships, individual's ability for change and perception, as well as the system's capacity to reorganize, persist, or reproduce. Future interdisciplinary studies should investigate the aforementioned issues since they might be key to explaining institutional change mechanisms in land-use situations.

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CRediT authorship contribution statement

Claudia Coral: Conceptualization, Methodology, Formal Analysis, Writing - review & editing. **Wolfgang Bokelmann:** Methodology, Supervision, Writing - review & editing. **Michelle Bonatti:** Supervision, Writing - review & editing. **Robert Carcamo**: Data Analysis, Writing - review & editing. **Stefan Sieber:** Supervision, Funding Acquisition, Writing - review & editing. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

Appendix A. : Selected testimonies related to the Socio Bosque programme

Interview Nr.	*Raw data translated by the author*
17	*"It is possible to reforest but having money, if I plant trees they will be giving fruits in 15 or 20 years, but I am already 50 years old and If I plant trees now, what do I live on? I will need people to help me in the forestry activities and I don't have money to sustain that forest. I cannot afford this luxury because I need to eat."*
4	*"The Government is giving a recognition, an award, to what we are doing, to preserve forest and that the forest has value makes that it is worth to conserve it at a national level. Because, in the past, you were paid to cut it. So now, they have realized – I dont say that is all the government, but rather a branch of it that understands. Within the Ministry of Environment, where 'Socio Bosque' is framed, there is a good understanding of the value of it. It is a protection and indirect protection of the State for 20 years… I would stand up for 100 years of protection or at least 30 or 50. But many younger people say no, that "what if I want to use later this land in another way?" They are right in*

(*continued on next page*)

(*continued*)

Interview Nr.	*Raw data translated by the author*
	some way, but if there is dedication and a decision to preserve a forest, this decision is not for today or tomorrow or the day after tomorrow, but forever. In fact, we are searching for a legal form that allows us to preserve the forest forever."
9	*"My land is not registered in the Socio Bosque program, because I don't like that people pay me money. Right from the moment when they pay you money, they have rights over your land. I am not interested that they pay me a cent, the right that a government like ours might have if they pay you to conserve the land, after 10 years they gave you 10000 dollars and they can say: I pay you the money let's see what I can do with the land."*
11	*"Because of the difficulties of agriculture and lack of labor, we registered the land in the Socio Bosque program. We took it as an alternative use for the land, just because we have so many hectares, it results in a significative income… the only regulation we have to follow is not to cut down the forest… sometimes they come with nonsense like that I have to make a path in the primary forest so the supervisor has access. But we have always been environmentalists, we always loved nature, so we have always been working in that line. We would have any way protected the forest and reforested it because our work line is conservation and education."*
11	*"As we do not do agriculture, rather we subscribe to Socio Bosque, they pay us, although they do not pay us when they should."*
13	*"I dont have much information about the Socio Bosque program, however, I don't like the partners or associates, especially if they are part of the government."*
13	*"I have not declared it [the land to SB] because I believe that more than declaring it I have been totally and absolutely demonstrative in front of the community, they know that I am a protector of nature … I do not have, let's say, compensation for maintaining the land, I have to pay taxes and I pay them in the most pleasant way but what interests me is that this willingness and attitude towards nature is not only mine but also belongs to my family and my heirs, that they continue to protect, because it is a way of paying tribute to the existence of each human being, if everyone collaborated in something, nature would be better because in nature there is no reward or punishment. If I do a reforestation, nature does not send me a certificate of good conduct. If I cut a forest, nature does not send me a fine certificate either, in nature then there are no rewards or punishments, there are only consequences, and those consequences are those that the human being could intervene so that those consequences are the best, the most positive."*

Appendix B. : Surface area of Protected Areas (PA) and Protective Forest and Vegetation (PF) areas of the Pichincha Province

Protected Area (PA) and Protective Forest and Vegetation area (PF)	Area (ha)	Year of creation	Protected Area (PA) and Protective Forest and Vegetation area (PF)	Area (ha)	Year of creation
Pululahua Geobotanical Reserve (PA)	3383	1966	La Balsa	346,81	1993
Cayambe Coca National Park (PA)	404,103	1970	La Paz y San José De Quijos (PF)	400	1985
Cotopaxi National Park (PA)	33,393	1975	La Perla (PF)	3.560	1985
Pasochoa Wildlife Refuge (PA)	500	1986	Maquipucuna (PF)	2700	1989
El Boliche National Area of Recreation (PA)	392	1979	Mashpi (PF)	767,78	2004
Antisana Ecological Reserve (PA)	120,000	1993	Mindo y Cordillera de Nambillo (PF)	19,200	1988
Ilinizas Ecological Reserve (PA)	500	1996	Milpe Pachijal (PF)	150	2000
Caracha (PF)	260	1987	Pacay (PF)	300	1983
Chilcapamba y Aromopamba (PF)	72	1990	San Carlos de Yanahurco (PF)	940	1986
Concepción de Saloya (PF)	260	1993	San Francisco (PF)	220	1994
Cuenca Alta del Río Guayllabamba (PF)	18,000	1989	Santa Rosa y Yasquel (PF)	2597	1987
Cuenca del Río Cajones (PF)	881.8	1998	Sigsipamba (PF)	350	1995
Cuenca del Río Lelia (PF)	3255.66	1994	Subcuenca Río Toachi-Pilatón (PF)	8018.40	1987
Daule-Peripa Subcuenca (PF)	219574	1987	Suro Chiquito (PF)	40	1997
Delta (PF)	90	1993	Tanlahua (PF)	940	1995
Don Segundo (PF)	66	1998	Tanti (PF)	850	1995
El Panecillo (PF)	90	1997	Toachi Pilatón (PF)	14, 900	1987
Estación Científica Río Guajalito (PF)	400	1994	Toaza (PF)	1190	1989
ZuletaFlanco Oriental Volcán Pichincha (PF)	10,016	1983	Umbría (PF)	1527	1994
Hacienda Pisulí (PF)	338	1979	y Anexos (PF)	4770	1994
Piganta	987.5	1984			

Elaborated by the author based on data from the Ministry of Environment (MAE, 2015). There might be other Protective Forest and Vegetation areas not listed in this table.

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