

Agrarian production, deforestation and rural actors in 19th century: the relation between agricultural systems and environmental conflicts in Costa Rica, 1800-1879

Producció agrària, deforestació i actors rurals en el segle XIX: relació entre sistemes agrícoles i conflictes ambientals en Costa Rica, 1800-1879

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Palabras clave

Recursos forestales, producción agrícola, justicia ambiental, extracción de madera, cultivos d'exportació

Resumen

Este artículo, a través de la revisión y análisis de fuentes primarias, datos estadísticos de encuestas poblacionales y agrícolas, y fuentes secundarias como libros y artículos científicos, demuestra la forma en que se ha desarrollado el sistema agrícola costarricense durante la mayor parte del siglo XIX, sustentado en la ganadería, los cultivos y la extracción de madera, provocando un severo impacto ambiental reflejado en la reducción de bosques. Al mismo tiempo, esta presión sobre los bosques ha provocado el surgimiento de conflictos ambientales entre diversos actores rurales por la explotación y administración de los recursos forestales.

Así, durante el período de estudio, se demuestra que el desarrollo del sistema agroproductivo costarricense ha provocado la reducción de bosques y la exclusión de grupos de personas de la explotación de recursos naturales esenciales para su bienestar.

Resum: Producció agrària, desforestació i actors rurals al segle XIX: relació entre sistemes agrícoles i conflictes ambientals a Costa Rica, 1800-1879

Paraules clau

Recursos forestals, producció agrícola, justícia ambiental, extracció de fusta, cultius d'exportació

Aquest article, a través de la revisió i anàlisi de fonts primàries, dades estadístiques en enquestes de població i agrícoles, i fonts secundàries com llibres i articles científics, demostra la manera com s'ha desenvolupat el sistema agrícola costarriqueny durant la major part del segle XIX, recolzat per ramaderia, conreus i extracció de fusta, provocant un sever impacte ambiental reflectit principalment en la reducció dels boscos. Aquesta pressió sobre els boscos ha provocat l'aparició de conflictes ambientals entre diferents sectors rurals per l'explotació i l'administració dels recursos forestals.

Així, durant el període d'estudi, es demostra que el desenvolupament del sistema agroproductiu costarriqueny ha provocat la reducció dels boscos i l'exclusió de grups de persones de l'explotació de recursos naturals essencials per al seu benestar social.

Abstract

Keywords

Forest resources, Agricultural production, Environmental justice, Timber extraction, Export crops

This article, through the review and analysis of primary sources, statistical data in population and agricultural surveys, and secondary sources such as scientific books and articles, demonstrates the way in which the Costa Rican agricultural system has developed during most of the 19th century, supported by livestock, crops and wood extraction, causing a severe environmental impact reflected in the reduction of forests. At the same time, this pressure on forests has caused the emergence of environmental conflicts between rural actors for exploitation and administration of forest resources.

Thus, during the study period, it is demonstrated that the development of Costa Rican agro-productive system has caused the reduction of forests and exclusion of groups of people from the exploitation of natural resources essential for their social well-being.

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1. Introduction

During the first decades of the nineteenth century, Costa Rica, while still governed by the Spanish Kingdom, introduces an agricultural system based on subsistence farming, extensive stock farming, and several export products, which did not ensure sufficient accumulation of wealth to revert the poor economy that prevailed during the colonial period.

In that period, the Costa Rican territory was characterized by its isolation from the main trading systems of the time, due to the lack of precious metals and other value-added products, as well as for its low population density, absence of transport routes, and low investment by the Spanish Crown.

During the colonial period, the economic, social, and political life of Costa Rica was marked by marginalization, concerning not only the metropolis, but other Spanish colonies as well. Costa Rica was the most neglected, marginal, and underdeveloped governance of all that belonged to the Captaincy General of Guatemala, which was already one of the most abandoned regions of the Empire. (Fonseca, 1997: 40).

Once Independence was achieved in 1821, the expiry of the imperial regulations on commerce allowed for the young nation to enjoy greater freedom in trading directly with worldwide metropolis thus obtaining more substantial monetary benefits. As a result, a capital accumulation was reached large enough to sustain the development of more profitable and competitive productive systems, which allowed to achieve an important modernization level of society.

Thus, the country began exporting coffee to Europe and United States on a continuous and successful basis, obtaining profits that underpinned the development of other productive systems, together with the growth of the *bourgeoisie* and the expansion of their lifestyles in the country's major cities. Alongside coffee export, liberal concepts of modernization and progress were institutionalized, which stimulated colonization, the expansion of export agriculture, industrial development, and higher living standards throughout the country.

Public actions were then carried out aimed at improving communication between regions, including growing extensions for agricultural production, and improving infrastructure for commerce, particularly for exports. As of 1824, among these actions were laws approving the occupancy of idle spaces, land privatization, and assignment of benefits and incentives for farmers. These were mainly aimed at promoting coffee growing and other commercial crops such as cocoa, sugar cane, cotton, and cattle breeding, both in the central and peripheral regions of the country, the construction of the railway between San José and Port

Limón in the Caribbean coast, which ensured a direct trade route with Europe and United States thus lowering export costs, and increasing profits for the country and its producers, as well as prompting an extensive banana cultivation (Morera, 2011).

In general, farmers devoted most of their land to cattle ranching, followed by forest exploitation and export products. In this sense, the development of the diverse agricultural production systems mentioned above, prompted a particular way of exploitation and management of the land and ecosystems, which has changed its approach and intensity over time. In this process, the goal of creating spaces to extend crops and pastures, increased deforestation and ensured a valuation of forest as obstacles to the growth of agriculture (Goebel, 2011).

It is understood that the impetus of such forms of exploitation has had various impacts at the environmental scope, as well as in the distribution of the resulting benefits and detriments among different social groups. Thus, this alteration to the environment by agricultural production systems has also produced repercussions on social ambit, specifically in the form of environmental conflicts, by contaminating or reducing the natural resource that sustains the reproduction of certain social groups. In this sense, the environmental conflict is understood as the confrontation between different social actors for access to nature and the concentration of exploitation of its resources, as they are considered uniquely or managed in an exclusive manner by a specific actor.

Thus, in the above-mentioned context, and in the framework of the agricultural system development and environmental conflicts, we intend to analyze the emergence of conflicts for the access and management of forests and other environmental goods and services during major decades of the nineteenth century, when Costa Rican agrarian system reached high levels of development united to severe social and environmental impacts.

2. Methodology

Through the review and analysis of primary sources, statistical data in population and agricultural surveys, and secondary sources such as scientific books and articles, it has been possible to construct the development of the Costa Rican agricultural systems in the main part of nineteenth century, during emerging and conforming of Costa Rican agrarian system. Furthermore, studies were performed regarding the way in which these systems affected the development of the natural environment, its administration and access by different social groups, along with the environmental conflicts this generated.

So, to obtain information on the conflicts generated by the appropriation, exploitation, conservation, and administration of the natural environment, a search was conducted in the data bases of the National Archives of Costa Rica, defining as documentation collections Police, Judicial, Governance, Finance, Forests, Crops, Contamination, and Forest

Products. Key words were also included, such as *firewood*, *timber*, *contamination*, and *conflicts*. At the same time, it has been consulted scientific literature about concerned subject.

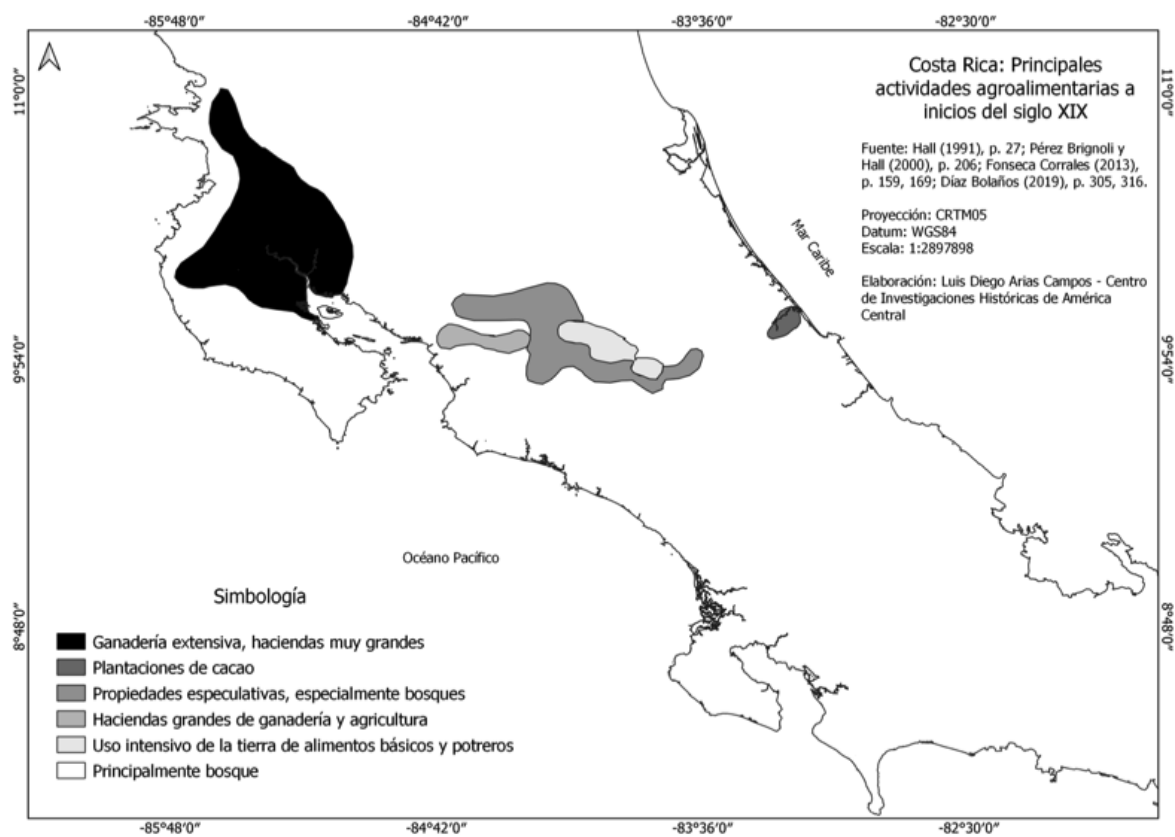
Thus, the results of secondary sources have been complemented with the analysis of archive's dates as the source for classifying the type of conflicts, based on the immersed actors, as follows: conflicts between private individuals and the State, between private individuals, communities and private individuals, communities and the State, and between companies and the State.

Subsequently, all the conflicts found were analyzed in a comparative manner regarding the reasons or catalysts for the situation of unrest, as well as the outcome, the year, and province where they occurred. Finally, the type, actors, and temporality of the conflict situation were linked to the economic and political factors inherent to the agricultural productive systems in place.

3. Agricultural production systems

Costa Rica initiates the 19th century with an agricultural production system located in three specific geographic regions: the Central Valley, where subsistence farming and cattle raising predominated, some low-impact commerce, as well as sugar cane and tobacco cultivation; the North Pacific, where livestock farming by big landowners prevailed, with a trend towards the export to Central America; and last, the Matina lowlands on the Caribbean coast, where cocoa cultivation predominated, destined for shipping to other Spanish colonies or for smuggling through European traders. These activities were known for their low technological and investment levels, so basically were intended for self-consumption. Even if carried out in large estates or if for export purposes, they never reached significant productive levels, nor did they generate substantial economic income (Gudmundson, 2010).

Map-Costa Rica: Main agricultural activities at beginning of XIX Century



3.1. Coffee

Although coffee was grown on a small scale since the end of the 18th century by landowners in the Central Valley, it was during the years following the country's independence that those landowners, now at the head of the country, identified the commercial opportunity for their coffee. Thus, an extensive coffee production intended for exportation was stimulated, while promoting land appropriation for its cultivation.

When the colonial period came to an end, both the Municipality of San José and Cartago encouraged coffee growing by giving away free seedbeds to those who requested them. This measure went hand in hand with the free granting of land, both for individuals as for family groups. On June 29, 1822, a decree issued by the Municipality of San José and signed by Juan Mora Fernández [president of Costa Rica], stipulated that *"all farmers who currently own coffee farms on State-owned barren lands, will now become the owners of such coffee-planted lands"* provided they will continue to devote the property to coffee-planting for the next five years. Since 1825, the tithe was also eliminated for a period of ten years for coffee cultivation. (Volio, Obregón, Loría, Obregón, Quesada, de la Cruz, 1997: 566).

In this way, coffee expansion began throughout the Central Valley and along other regions of the country, eventually becoming the major source of foreign currency, thus ensuring an important concentration of capital for the coffee growers, which, in turn, would later fund the development of other economic systems and the social and productive modernization of the State.

In this respect, by the end of the 1830s, coffee stood as the export product that generated the highest income. In 1839, coffee yielded 31.1 thousands of pesos, stepping up to 115.0 thousands of pesos in 1841, and reaching 201.5 thousands of pesos in 1843. Thus, coffee exceeded other traditional products at that time, such as the Brazil wood tree, leather, and cane sugar (León, 2003). During the following decades of 1850 and 1890, coffee represented almost 90% of the value of the country's total exports (Molina, 2002).

The highly successful and lucrative coffee cultivation and export supported the development of the country's capitalist agriculture from the 1850s on, thus consolidating the predominance of a trading and export agricultural system, reducing subsistence agriculture considerably, increasing peonage (debt bondage) and labor recruitment, intensifying the social division of labor, expanding agricultural credit both public and private, increasing the concentration of land by landowners, particularly coffee growers, and lastly, enhancing the urban *bourgeoisie* at the social and economic levels (Volio, Obregón Loría, Obregón Quesada, de la Cruz, 1997).

During the 1870s, the construction of the railroad to Port Limón fostered the incorporation of new territories in the Caribbean to the agricultural system. As colonization increased in the peripheral regions and agricultural areas expanded, coffee was now planted beyond the Central Valley.

By the end of the nineteenth century, coffee cultivation began gradually expanding to the eastern and northern regions of the country, mainly moved by the construction of the "Atlantic Railroad". Coffee planting was also furthered in areas to the South of San José, such as Tarrazú, Aserrí, and Acosta, as well as in the eastern part of the Guanacaste province. By then, the low production in some of the Central Valley coffee farms, warned of the need to expand the coffee-growing agricultural frontier. (Viales y Montero, 2010: 21)

The transportation routes to the Caribbean, along with other routes being built to connect San José with the peripheral regions, fostered the development of agricultural-productive systems beyond the Central Valley, ensuring the expansion of coffee cultivation and the profits derived for the farmers.

3.2. Sugar cane

This product was used during a good part of the colonial period for consumption by the families to satisfy their needs for sugar, raw sugar, cattle feed, alcohol, and “aguardiente”, a form of cane liquor (Fonseca, 1997). Following independence, with the purpose of boosting colonization and the agricultural-productive system, sugar cane cultivation flourished, particularly in the western and northern sectors of the Central Valley, becoming consolidated as sugar cane development regions since the beginning of the 1840s and 1850s. During the following decades, large sugar mills, now boasting modern technology, took over the sugar production which soared to extensive levels. Export credits were facilitated, while the proletarianization of a large number of peasants took place as they found jobs during the sugar harvest (Volio, Obregón Loría, Obregón Quesada, de la Cruz, 1997).

Outside the Central Valley, sugar cane fields also stretched out on the lands that were gradually integrated as the construction of the railroad to Port Limón advanced. Consequently, production escalated reaching capitalist levels, which attracted migrant populations and transformed the forest cover in wide and shining sugar cane fields (Molina, 2002).

3.3. The cattle raising hacienda

While the livestock activity maintained a limited presence in practically all the country during the colonial period, in Guanacaste, however, it reached the height of its development in large haciendas with extensive lowlands planted in pastures. These haciendas used rather rudimentary technology, and livestock was generally sold in the Nicaraguan and Central Valley markets (Díaz, 2014).

Between 1840 and 1860 the livestock activity experienced a significant escalation due to coffee expansion in the Central Valley which triggered a change in land use, particularly from pasturelands to coffee plantations. This caused an increase in beef demand throughout the region, which was covered by the Guanacaste haciendas, without failing to meet the Nicaraguan demand (Vargas, 2011).

Thus, the rise in livestock production caused the expansion of pasturelands over forested areas, increasing, in turn, logging and deforestation. This led to a reevaluation of the Guanacaste forests in the timber market, particularly of precious woods intended for both the domestic and export markets. Timber production reached its highest peak in the 1880s, when the Government declared timber export duty-free, and in the 1930s, when the activity decreased due to the world-wide economic crisis of that time (Díaz, 2014).

The growing demand of beef in the Central Valley encouraged the Guanacaste ranchers to modernize their livestock production techniques; hence, they improved the cattle breeds and introduced more adaptable grass species for the climate conditions of the region. Such improvements caused the concentration of land and capital by large landowners, as well as demographic pressure on the agricultural frontier, and a greater salaried labor demand (Sequeira, 2009).

3.4. The Brazil wood tree

The dye from this tree came close to becoming the main export product during the first half of the nineteenth century, prior to the coffee boom. At that time, the strong demand for dyes in Europe encouraged the increasing cultivation of the Brazil wood tree, mainly in the Nicoya area. In short, its greatest surge occurred between 1800 and 1840, reaching its peak in the 1830s, during which time it became the country's leading export product (Molina, 2002).

The production of the Brazil wood tree reached quite high levels, achieving a significant share within the international trade market. In 1833, the national production stood between five and ten percent of the total world production. Despite the dynamism of the activity, which had even managed to meet an increase in the demand during the second half of the Nineteenth century, was unable to continue due to the fact that the extractive level of the trees, in addition to their concentration in a relatively reduced area, triggered an overexploitation of the plantations which were unable to regenerate at the same pace they were being exploited, leading finally to abandonment of the plantations (León, 2003).

3.5. Banana

The construction of the railroad between the Central Valley and Port Limón in the 1870s, boosted the export agriculture in the Caribbean region. This means of communication spurred colonization and the expansion of commercial crops of the Central Valley to new lands and natural spaces considered as "idle or uninhabited". The concessionaire of the work, the American citizen, Minor C. Keith, received great extensions of land from the Government on both sides of the railroad under construction, which he dedicated to banana cultivation for export purposes to the United States.

Before long, the extensive banana cultivation became the main economic activity of the Caribbean region, directed by Keith through his enterprises, particularly the United Fruit Company (UFCo) which went into operation in 1899. It was through the latter that Keith developed the banana culture, controlling practically all the productive and commercial process. During its full operation, the UFCo accounted for more than one hundred thousand hectares of land in the Caribbean (Viales and Montero, 2011).

The development of the banana activity and its exportation showed a significant and immediate impact on the Costa Rican currency, which began to increase considerably in time.

... in 1881, barely 8,500 bunches were exported... Two years later, in 1883, exports reached 110,800 bunches; followed by 420,000 bunches in 1884; 595,500 in 1886; and 854,400 in 1888, reaching over a million bunches in 1890. During the following years, banana exports continued to increase, exceeding a million and a half bunches exported in 1895, two million in 1897, and 3.4 million in 1900. (León, 2003:168)

Banana cultivation for export purposes developed into one of the major productive activities in the region and the country, thanks to the construction of the railroad which, in turn, led to the creation of new ways of communication, the colonization of the region parting from the Central Valley, and its integration to a novel economic system based on agricultural exports, which by the end of the nineteenth century comprised the national territory almost completely.

3.6. Exploitation of forests

As we have seen, the economic model consolidated since the nineteenth century presents the cardinal characteristic of being depredatory at the environmental, as agriculture expanded, the reduction of forests increased, as well as the pressure exerted on the goods and services granted, since the forests and their products are subject of dispute by diverse social actors due to their commercial and strategic value for generating wealth and ensuring social reproduction (Goebel, 2016). These things happened despite the existing legislation destined to preserve Nature and reduce the environmental impact of the productive activities. At the beginning of the Nineteenth century colonial laws still protected the forests and the water sources for the supply of water, firewood, and for securing the hillsides for cropping (Morera, 2011).

Following independence in 1821, new environmental regulations were issued at municipal and national level. Thus, between 1833 and 1884, laws and decrees addressed to the conservation of the forest cover in areas close to rivers and communities were created, as well as to regulate the exploitation of forests in wastelands or close to main communication routes (Goebel, 2011). In general terms, these norms did not appear to have a great bearing on the conservation of the forests, due to a constant and intensive growth of the agriculture and deforestation. Between 1820 and 1840, deforestation had already reached between 8% and 10% of the national territory. Later, with the incorporation of the Atlantic/Caribbean and Western regions, deforestation and the pressure exerted on the forests would increase substantially (Morera, 2011).

In this regard, Anthony Goebel (2011) asserts that the deforestation processes did not only correspond to the objective of creating spaces for extending crops and pastures but were also the result of an interest in marketing the lumber of the forests. Therefore, forest resources were not only considered an obstacle for agriculture, but they had a commercial value per se which turned them into another commodity for the insertion of the national economy in the global market. Between 1893, when the serial registers of lumber exportation began, and 1899, in full apogee of the liberal politics of modernization, colonization and expansion of the agricultural export model, lumber exports soared from 5,341,624 to 23,304,158 kilograms. This meant an increase of 17,962,534 kilograms of lumber, particularly precious woods, in only six years.

Thus, the exploitation of forestlands was not only a necessary factor for the reorganization of land use in terms of increasing the agricultural areas and land extensions for cattle raising, but it was also a lucrative business for forest owners. Consequently, lumber, alongside coffee and banana, served as a marketable product to boost the national economy at the international level, to develop an agrarian capitalism, and grant a greater monetary and market value to the country's natural resources.

4. Environmental conflicts

As observed, the production systems established in the nineteenth century were characterized by the expansion of cropping, cattle breeding, and the extraction of timber in forests and natural terrains. This behavior of the agricultural production systems caused extreme damage and alteration of the ecosystems, noted particularly in the overexploitation, destruction, and contamination of forests, soil, and water sources. Thus, along with the expansion of cropping, timber extraction, and livestock, the forestlands diminished, generating more pressure on the natural resources and services, impacting directly on many communities since they were banned from accessing the biomass that sustained their reproductive cycles.

In this scenario, it has been concluded that the conflicts resulting from the type of relation established with Nature and between the same actors in a precise historical moment, should be understood as the outcome of a relation with the natural environment that affects the welfare or interests of another social actor. Therefore, the origin of the dispute is to secure the subsistence means supplied by the ecosystems (Folchi, 2001).

There are different actors interested in seizing Nature's resources to ensure their social reproduction, but such action sometimes clashes with other actors' interests, as well as against established forms of administration and distribution of environmental resources and services. One key factor in the way other social groups are affected is when one sole actor controls the exploitation of the ecosystems, thus hampering sustainability or moreover, contaminating or destroying the resources that support the *modus vivendi* or subsist-

ence of other social groups. So, clearly, conflicts arise within the social relation with the biomass of the immersive ecological environment, and within sustainability itself (Infante-Amante et al., 2017).

Allowing to Soto et al. (2007), the environmental conflict should be classified according to its reproductive and distributive nature, based on the levels of modification of the types of resource management or of generation of environmental damages. Likewise, it should be evaluated, whether in a negative or positive way, based on the changes it generates when in presence of greater or lesser sustainability of the ecosystems. Social development depends on the available biomass; thus, should the productive system consume a greater amount of the resource regenerated in the ecosystems, social stability will be threatened, and people will confront each other to secure their needs of the ecological resource or control its availability. Environmental conflicts emerge within the relation established between people and Nature, due to the unequal distribution of the resulting ecological resources.

The diverse actors that are part of the environmental conflicts usually justify their actions and assess the conflict from many different standpoints, reasons, or ideologies, even though lacking an explicit interest in the conservation of Nature or environmental justice. According to Martínez-Alier (2006), commonly, in the communities in conflict, the desire to maintain their lifestyles and the biomass that sustains them prevails. In this same line, Folchi (2001) asserts that, since these conflicts are disputes concerning the environment between actors that seek their subsistence, its justification through price or ideology doesn't matter. All they intend is to safeguard the resource that sustains their lifestyles.

Rodríguez et al. (2019), on their part, establish that environmental conflicts have certain specific characteristics, both unique and particular, which are shown below:

- They involve a great diversity of actors such as communities, ethnic groups, local and national governments, private enterprises, civil society organizations, unions, etc.
- They develop in the context of an imbalance of power and very marked asymmetric relations
- The use of Nature and its resources is usually related with symbolic and historical values, distinctive of specific groups or of the entire nation.
- Although the conflicts usually occur at the local level, they also have a sphere of influence at the regional, national, and global levels.

- It is common that the resources under dispute be strategic for the economy and politics. Therefore, its control is key for certain national and international elites.
- In general terms, the systems controlling the natural resources are a combination of traditional and formal institutions which are ruled by intricate regulations, sometimes contradictory among themselves.

Thus, it is evidenced that diverse types of actors usually find themselves immersed in the disputes for the ecological allotment as regards the distribution of Nature and its resources, which was considered inequitable, affecting lifestyles as well as the accomplishment of the reproductive cycles. The diversity of such actors as well as the importance of the resource in dispute, caused the conflicts to exceed the local level of action and reach spheres of influence both at the national and global levels.

4.1. Classification of environmental conflicts

González de Molina et al. (2015) determine that the environmental conflicts are aimed at making changes in the social metabolism and promoting its evolution, even though these changes are not always immediate or extreme, but instead, tend to evidence the effects on the environment or mark the course towards the change in metabolism and the current level of sustainability.

Within the modification of the way resources and sustainability levels are managed it is possible to typify the conflicts according to their characteristics. The socio-environmental conflicts are defined as conflicts of a distributive type known as environmental, while the conflicts of reproductive type are called environmentalist. In the former type, sustainability is not the objective and diverse languages may be used in the protest, while in the latter, sustainability is the objective and varied expressions can also be used in the dispute. Lastly, there are the ecologist conflicts of reproductive type, which aim at sustainability and utilize an explicit ecological discourse (González de Molina, 2009).

Conflicts between social groups with different types of metabolism are also common. These groups struggle to impose or uphold their system of a relationship with Nature or argue from opposite standpoints or interests regarding the use, control, access, or management of natural resources (Rodríguez et al., 2019).

González de Molina et al. (2015) defines these conflicts as inter-metabolic which fall under certain type of conflicts such as farmers with an implicit organic metabolism against the imposition of industrial metabolism by capitalist sectors with very different economic, social and ecological principles. In turn, there are the intra-metabolic conflicts which correspond to groups facing the attribution of environmental goods and services but interacting within the same metabolic organization now consolidated.

5. Selected conflicts cited in the literature

Marisol Morera (2011) describes two conflicts concerning forest management that arose between 1821 and 1840 in the province of Heredia. The first one explains how neighbors of Villa de Barva protested before the Municipality because another neighbor called Domingo Mattey initiated actions to seize 70 *caballerías* of forests and lands close to the settlement involved, from which the neighbors obtained timber and other resources for their livelihood. The plaintiffs asserted that the resources found in those natural areas were essential for completing their reproductive cycles; therefore, its privatization or overexploitation would impact directly on their livelihood. Hence, should the complaint be assigned to Mattey, the neighbors would have to find another place to live since they would be excluded from accessing the resources of the lands in question.

The second conflict involved the Municipality which filed charges against the neighbor Rafael Orozco for clearing forests in wastelands close to the village. For the Municipality, the clearing of forests adjacent to settlements and important rivers, infringes upon the subsistence and welfare of the entire neighborhood since it jeopardizes the availability of water and other resources such as timber, and affects the stability of the soil and hillsides as well.

It is shown that, in both conflicts indicated, the actors faced were a municipality and a community of neighbors against particular individuals, who defended within the institutional system a specific form of administration and exploitation of the environment according to their own interests.

On his part, Mario Ramírez (2004) studied the emergence of conflicts surrounding the coffee activity in the Virilla River basin in the period between 1850-1900. The coffee mills constituted most of the production units established in the zone, with a productive development that went from the farmer unit to the capitalist agricultural industry, generating high water consumption and the deposit of substantial organic waste containing carbon, yeasts, and water resulting from coffee processing. According to calculations made between 1850 and 1900 in the entire coffee-growing area, close to 181.4 million kilograms of coffee pulp or solid coffee waste were disposed of, with a monthly average of 1.2 million kilograms dumped into the ecosystem. Likewise, at least 8.4 million liters of wastewater were discarded, for a monthly average of 56,997 liters. Most of these disposals were filtered or carried away by surface water or groundwater flows.

In this scenario, during the period under study, numerous complaints were presented by neighbors before institutional authorities against the coffee units due to the concentration of exploitation and contamination of the water sources. Thus, the protests arose for water monitoring, preserving public health, and the consumption of safe water, due to the over-

exploitation and contamination of water sources by the coffee mills. They visited the Municipalities of each canton located in the Virilla basin, particularly in San José, Santa Bárbara, and Santo Domingo in the province of Heredia, which concentrated the largest expanse of the coffee-growing area.

In this case, the actors in the conflict are groups of neighbors who faced capitalist productive units defending their access to water. As it is shown, the contamination of water resources by waste from a productive unit with an immersed industrial metabolism forced the residents to file complaints within the institutional system in order to maintain access to water.

On their part, Viales Hurtado and Montero Mora (2011) mention that ending XIX century in the Atlantic/Caribbean region, the expansion of the banana monoculture by the UFCo concentrated the exploitation of forests and timber, thus barring local populations. So, residents of Siquirres had to complain before the Municipality to ensure their access to the resources, vital for their subsistence such as wood and timber, upon losing access to the forests now under the company's control. While in Turrialba, another group of neighbors complained by the same means for the felling of Laurel trees by the company, arguing that this affected the water supply for the community.

The concentration of forest exploitation and its resources by the UFCo, with the purpose of satisfying their productive needs such as expanding their plantations or obtaining lumber for building infrastructure, excluded groups of neighbors from firewood they used as fuel, the wood for daily needs, and from the water supply. So, different conceptions of forest exploitation and its appropriation levels and reproductive interests, confronted locals against the UFCo when they realized that unequal appropriation of the forests by the transnational company was excluding them from the essential resources, hence compromising their livelihoods.

Both actors required the exploitation of the forests to ensure the compliance of their reproductive cycles, without any interest at all in the conservation of the environment. What led the neighbors to protest was the fact that they were excluded from the access to the biomass that supported their *modus vivendi* and their own sustenance. The quarrel occurred because of the inequitable management of forest exploitation, so it was referred to the municipal authorities.

Finally, Anthony Goebel (2016) confirms that, in last decades XIX century, numerous conflicts for the appropriation, exploitation, and conservation of forest resources occurred in the Central Valley because coffee expansion and the capitalist intensification of agriculture which reduced the accessibility to the forests and its resources in a zone that concentrated the country's largest population groups.

In these cases, local residents confronted productive units because they concentrated the exploitation of nature, in such a way that residents were excluded from access to natural resources considered essential to sustain their ways of life.

In general terms, according to analyzed conflicts, the actors involved are identified as communities of neighbors, private individuals, municipalities and productive units, who faced each other to ensure access to natural resources essential to maintain their reproductive cycles or a specific metabolic system. In this way, the conflicts are defined as distributive, because the main interest was maintaining access to key natural resources and not the sustainability.

In most of cases the conflict was originated because one intensive or illegal appropriation of forests and their resources by a private individual or an agricultural productive unit, and to a lesser extent because the contamination of water resources by one industrial agricultural unit. These conflicts occurred both in the Central Valley of the country and in the coastal regions, and practically throughout the entire study period.

It is important to mention that all of the conflicts were channeled through institutional channels, which shows a generalized level of trust in the functioning of the state apparatus for the defense of particular interests. Unfortunately, the documents consulted do not show the final solutions to the conflicts.

6. Conflicts registered in national archives

As regards the information gathered at the National Archive of Costa Rica between 1800 and 1879, the conflicts for the management and exploitation of forests and their resources, particularly wood, occurred mainly between neighbors, as well as between the State and individuals and communities, due to the exploitation of such goods in natural spaces devoted to conservation, which led public entities to establish claims against lawbreakers, whether individuals or communities.

In total, 36 conflicts concerning forests were reported, analyzed according to the categories of conflicts between private individuals (5 conflicts), conflicts between State and individuals (15 conflicts), and conflicts between communities and State (16 conflicts, between 1800 and 1879).

6.1. Conflicts between private individuals

These conflicts, five in total, derived from the allegations between neighbors for the destruction of public forests (4 conflicts) and the illegal extraction of wood (1 conflict) without the corresponding public authorizations for realizing such actions. The final resolution to the conflicts remains unknown.

Thus, different private individuals accused each other through institutional system because carrying out illegal exploitation of forests, which was considered to violate individual and collective interests, in reference to the violation of environmental regulations established to ensure the benefit of neighboring communities.

6.1.1. Province and year

The conflicts in question occurred mainly in the province of Heredia, two conflicts in 1846 and 1847, in the province of San José, two conflicts (1869 and 1875, while in the province of Guanacaste only one conflict was reported in 1833.

Table 1. Total conflicts between individuals by province and year, 1800-1879

| Province | Number | Year |
|------------|--------|------------|
| San José | 2 | 1846, 1847 |
| Alajuela | 2 | 1869, 1875 |
| Guanacaste | 1 | 1833 |
| Total | 5 | |

Source: Prepared by the author

Thus, according to the data accessed, the majority of conflicts between particular individuals occurred in provinces in the Central Valley (Alajuela and San José), and only one conflict was reported in a peripheral province (in Guanacaste). Furthermore, in general, the conflicts occurred in the middle and late decades of the study period.

6.2. Conflicts between the State and private individuals

Fifteen conflicts of this type occurred caused by the felling of forests and the illegal extraction and sale of wood. Thereby, the lawbreakers were accused by the public authorities.

It is believed that private individuals acted in this illegal manner with the aim of benefiting from the exploitation of leafy forests separated from productive systems, which would generate substantial profits mainly through the sale of wood. Because these forests were closed in order to ensure their conservation for the public benefit, state authorities had to prosecute those individuals to enforce the relevant laws.

As to the above conflicts, one was settled through an agreement with the offender, three by payment of a fine, three were solved by confiscating the wood, four disputes were set-

ted by stopping the exploitation activities, and in four cases the final resolution remained undetermined.

6.2.1. Province and year

The greater number of conflicts was concentrated in Cartago (5 conflicts: 3 in 1831, 1 in 1834, and 1 in 1843), followed by San José (3 conflicts: 1 in 1832, 1 in 1834, and 1 in 1844), Guanacaste (3 conflicts: 1 in 1834 and 2 in 1835), Heredia (1 conflict in 1867), and Alajuela (1 conflict in 1874). Furthermore, 2 conflicts occurred in an unspecified place in 1831.

Table 2. Total conflicts between the State and private individuals by province and year, 1800-1879

| Province | Number | Year |
|------------|--------|------------------|
| Cartago | 5 | 1831,1834, 1843 |
| San José | 3 | 1832, 1834, 1844 |
| Guanacaste | 3 | 1834, 1835 |
| Heredia | 1 | 1867 |
| Alajuela | 1 | 1874 |
| Unknown | 2 | 1831 |
| Total | 15 | |

Source: Prepared by the author

Thus, again the majority of conflicts occurred in the provinces of the Central Valley and a minority in a peripheral area, in this case again in the province of Guanacaste. It is believed that this situation occurs because the largest population of the country resided in the Central Valley where local forest began to reduce, and because the agricultural system in Guanacaste was based on extensive livestock farming and the sale of fine woods in the national and international market.

Likewise, in this case, the conflicts occurred practically throughout the entire study conflict; situation that is due to the continuous development of the national agrarian system, which expanded in 19th century throughout all regions of the country, based on the exploitation of forests to development agriculture and livestock.

6.3. Conflicts between local communities and the State

Within this category, 16 conflicts were examined, as follows: extraction and appropriation of wood (7 conflicts), sale of wood (2 conflicts), felling and destruction of forests (4 conflicts), and for demanding access to the forests (3 conflicts). In this last case, the neighbors sued the State for eliminating the restrictions to the exploitation and the access to the forests and its wood.

The solutions reached for the above-mentioned conflicts was the following: in 2 occasions the neighbors obtained more freedom to exploit the forests, 8 resolutions instead allowed to increase public control on the exploitation of forests and wood, and in 6 cases the result of the conflict was not established.

6.3.1. Province and year

The province with the greater number of conflicts reported was Cartago (9 conflicts): 1 in 1827, 1 in 1831, 2 in 1833, 1 in 1834, 1 in 1836, 2 in 1837 and 1 in 1843), followed by San José (4 conflicts: 1 in 1827, 1 in 1844, 1 in 1862 and 1 in 1865), Heredia (2 conflicts: 1 in 1833 and 1 in 1843) and finally, Alajuela (1 conflict in 1864).

Table 3. Total of conflicts between communities and State by province and year, 1800-1879

| Province | Number | Year |
|----------|--------|------------------------------|
| Cartago | 9 | 1827, 1831, 1833, 1837, 1843 |
| San José | 4 | 1827, 1844, 1862, 1865 |
| Heredia | 2 | 1833 ,1843 |
| Alajuela | 1 | 1864 |
| Total | 16 | |

Source: Prepared by author

Based on the fact that all of the conflicts reported within the category of local communities against the State occurred in the provinces of the Central Valley, where the majority of the national population is concentrated and where the development of extensive agriculture began, which was later expanded to the peripheral provinces, it is maintained that these conflicts were due to the fact that the forests were already beginning to become scarce, so neighbors had difficulties obtaining the forest resources necessary to sustain their ways of life. In this sense, the local communities were forced to pressure the State to allow them access to exploit forests excluded from the agricultural system.

This situation seems to have started in the first decades of the study period, and to have remained constant until the middle of it, which could be due to the reduction of pressure on the forests in the Central Valley due to the expansion of the agricultural system towards the provinces of the periphery.

In general way, at the overall level, as noted, most conflicts concern allegations for illegal appropriation of wood and irresponsible exploitation of forests that hold a certain degree of conservation by the State, placing the State, the private individuals, and the communities as the main actors. In this case, the allegations have been mostly from the State against private individuals for the illegal action of misappropriation of wood and other forest resources, and civil allegations against the State for the elimination of restrictions for the exploitation of public and protected forests. To a lesser extent, allegations have been made among private individuals for the exploitation and illegal appropriation of forests and timber.

The largest number of conflicts with a known location were registered in the province of Cartago (14 conflicts), followed by San José (9 conflicts), Heredia (5 conflicts), Guanacaste (4 conflicts), and finally, Alajuela (2 conflicts).

Table 4. Total forest conflicts by province, 1800-1879

| Province | Number |
|------------|--------|
| San José | 9 |
| Alajuela | 2 |
| Heredia | 5 |
| Cartago | 14 |
| Guanacaste | 4 |
| Unknown | 2 |
| Total | 36 |

Source: Prepared by author

For their part, according to the defined year of occurrence, the greater number of conflicts occurred in the decade of 1830 (14 conflicts), followed by the decade of 1840 (7 conflicts), 1860, (5 conflicts), and 1820 and 1870, both with two conflicts each.

Table 5. Total forest conflicts by decade, 1800-1879

| Decade | Number |
|---------|--------|
| 1820 | 2 |
| 1830 | 18 |
| 1840 | 7 |
| 1860 | 5 |
| 1970 | 2 |
| Unknown | 2 |
| Total | 36 |

Source: Prepared by author

As regards the final resolution of the conflicts, in the cases where it was stated, the majority was addressed to penalize the offenders of the environmental regulations, as well as to the increase in public control on the access to forests in reserves, and to a much lesser extent to the conciliation and granting of more access to exploitation and wood extraction.

Table 6. Total forest conflicts by outcome, 1800-1879

| Outcome | Number | % |
|---|--------|------|
| Agreement between the parties | 1 | 2.7 |
| Payment of a fine | 3 | 8.3 |
| Timber confiscation | 3 | 8.3 |
| Halt the felling of trees and timber extraction | 4 | 11.1 |
| More access to forests | 2 | 5.5 |
| Increase controls | 8 | 22.5 |
| Unknown | 15 | 41.6 |
| Total | 36 | 100 |

Source: Prepared by the author

Thus, the State, as the main administrator of the nation's natural heritage, has acted to ensure the regulation of logging and keep forests in conservation, in order to ensure public benefit. Therefore, the State has been the actor that has presented the most participation in the conflicts analyzed, where it appears both as the accusing party and as the defendant.

Finally, the conflicts are defined as distributive, because the main interest was maintaining access to key natural resources and not the sustainability.

7. Final considerations

Costa Rican agricultural production system is known for its high level of appropriation of Nature and its resources, particularly wood, and for transforming natural spaces into pasturelands and into staple and export crops. During this part of nineteenth century analyzed an increase in settlements and the agricultural export system boosted the intensive agricultural development beyond the Central Valley, leading to a significant escalation in the agricultural production at the expense of the forests, from which wood for fuel or artisan constructions was extracted, including precious and highly marketable hardwoods, or on the other hand, they were simply converted into pasturelands or cropping fields.

So Agricultural development increased the pressure on the natural areas, causing not only its destruction and deforestation, but a struggle between diverse social sectors for the appropriation of forestry goods and services, deemed necessary for ensuring the reproduction of peasant units as well as for agroindustry. Thus, this pressure of agriculture on forests produced environmental conflict throughout the study period, with the State, private individuals and communities, as the main parties involved.

The conflicts originated from the appropriation and administration of forests and their resources, as it was considered arbitrary, illegal, exclusive or contrary to the common good, by a specific social actor. With the agricultural development and its expansion in all the provinces, the struggle for the ecological resource increased and was no longer concentrated in the Central Valley. On this way, such actors had to compete for the natural resources, both between themselves as with the State who took action to safeguard the natural zones, whose forests and resources were to be protected and kept out of the agricultural productive system to guarantee common welfare.

The State maintained a relevant paper in the conflicts not only due to its obligation to enforce laws and regulations on the conservation of Nature for common welfare, but also as the cause itself of the conflicts as its role was considered extreme when groups and communities were deprived from accessing the resource they needed to survive. While individuals on their part showed interest in benefitting from the forest resources closest to them, even if these were protected by a specific legislation.

The impulse to take advantage of public forests became a catalyst of the conflicts against the State and other individuals. Thus, obtaining benefits at a lower cost or satisfying an urgent need, led in many cases to a confrontation with large companies or against the State itself, in a context where agriculture expanded, threatening sustainability and the biomass that secured the livelihoods of many social groups.

Considering characteristics of conflicts analyzed, is possible to defined them as distributive conflicts, especially because sustainability was not the main objective of confronted actors, it was to obtain the biomass to complete needs of their social style of life.

As well, these conflicts were in intra-metabolic type, because groups faced the attribution of environmental goods and services but interacting within practically the same metabolic organization consolidated.

Finally, we believe that foreign exchange and the economic income generated by intensive agricultural activities could be a factor that assures state complacency for the agricultural system, despite the damage to the environment and the environmental conflict it causes.

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