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Contribuciones a la historia ambiental de América Latina

Memorias del X Simposio SOLCHA

Compiladores:

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TERCERA SECCIÓN
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Juan Agustín Guerrero. Siglo XIX. *El Tungurahua en erupción*. Acuarela sobre cartón, 13 x 16 cm. Colección Nacional, Museo Nacional del Ecuador (MuNa), Ministerio de Cultura y Patrimonio.

18 | Environmental injustice and colonial and post-colonial cultures: the case of Indian Ocean World (1740-1940)

Pablo Corral-Broto*

The lock-down and confinement of the economy for months due to the COVID-19 has shown the necessity of autonomy on islands. Reunion Island (France), as remote and Sub-National Island Jurisdiction (SNIJs), must deal with a number of historical situations: ultra-peripheral and insular status and mainland supply dependency (energy, food and materials). Despite the extractive past as “sugar Islands” (Moore 2000), this island is biodiversity hotspots and World Heritage Site. Nowadays, these islands try to balance between residual colonial economies, tourism development and food security which is difficult to reconcile with cutting-edge biodiversity conservation programs. From an environmental history perspective, to increase island resistance/resilience and to enhance socioecological transitions respecting history and cultural traditions we analyze here the historical metabolic balances on this SNIJ island and how can they inform socioecological transition, based on their own past.

In this paper we will analyze what environmental and social metabolic injustices existed and persisted in the Reunion Island. We pretend to respond to two questions: how was established the hierarchy between the profitability of the plantation system over food sovereignty and welfare of the island population and, secondly, what environmental and food measures were implemented to establish a balance between making economic profit and feed the people. For this we will review environmental tropical historiography and we will focus on the comparison of new sources for the years between 1930 and after the departmentalization (1948). Our archives are the Departmental Archives of La Réunion, henceforth ADR; the National Archives of Outermost-ANOM and the French National Library-BNF.

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Over the time, different aspects of the human and natural relationship in the Indian Ocean have shaped a wide range of landscapes. On Reunion Island, environmental historiography has focused on climate change consciousness because of Pierre Poivre’s description of the influence between deforestation and climate change, since the colonization of the Reunion and Mauritius islands, called *Île Bourbon* and *Île de France* (Grove 1995). These pioneers also promoted the protection of nature and biodiversity, although the appropriate term would be “*Protéger le Jardin d’Eden*” (Quenet 2013). The environmental culture of the governor of Île de France, Pierre Poivre, and his creole pupil of Île Bourbon Joseph Hubert was twofold: to ensure the food security of the colony and to protect these *Eden* in order to guarantee the extractive colonial economy. The *extractivism* of spices, such as cloves, coffee and some sugar plantations could not jeopardize the fragile insular balance.

The study of Hubert’s diaries shows that the introduction of plants to guarantee the insular food demand, to increase the stock of the insular metabolism, was combined with the demand for the distribution of land to the south of the island and the manumission of slaves. Hubert introduced the plants he called “useful” (see Table 18.1). But he also knew that arable land had to be distributed in small plots to ensure the island’s viability (Hubert 1881).

Table 18.1. Useful plants introduced by Joseph Hubert (1750-1830) with the help of Mr. Ceré and Mr. Poivre

To feed	To trade	Curing and medicine	Wood, varnish, etc.
Breadfruit tree (<i>Artocarpus altilis</i>)	Nutmeg tree (<i>Myristica fragrans</i>)	Ayapana (<i>Ayapana triplinervis</i>)	Candlenut (<i>Aleurites moluccanus</i>)
Mangosteen (<i>Garcinia mangostana</i>)	Cinnamon tree (<i>Cinnamomum verum</i>)	Lebeck tree (<i>Albizia lebeck</i>)	
Cherimoya (<i>Annona cherimola</i>)	Cocoa tree (<i>Theobroma cacao</i>)	Ravensara (<i>Ravensara aromatics</i>)	
Avocado (<i>Persea americana</i>)	Black pepper tree (<i>Piper nigrum</i>)	Jatropha (<i>Jatropha integerrima</i>)	
Lychee (<i>Litchi chinensis</i>)	Robusta coffee tree (<i>Coffea canephora</i>)		
Coconut trees (<i>Cocos nucifera</i>)	Tea (<i>Camellia sinensis</i>)		
Banana trees (<i>Musa × paradisiaca</i>)	Vanilla (<i>Vanilla mexicana</i>)		
Mango trees (<i>Mangifera indica</i>)			
Sapodilla (<i>Manilkara zapota</i>)			
Loquat (<i>Eriobotrya japonica</i>)			

Source: Hubert 1881.

Hubert observed the acclimatization of all these trees and plants after the coffee plantation developed by the monopoly of the royal *Compagnie des Indes Orientales* during the seventeenth century. He tried to diversify cultures. One kind of culture was focused on trade, such as coffee, cocoa and spices. In 1785, he said in a letter:

I think we can prepare cocoa too, and bring our chocolate to India. We will have vanilla someday. Mr. Motais has written to the minister for that. Mr. de Crémont promised me that he would use all his credit to get it for us. In the meantime, we will make healthy chocolate; we will still be able to use cinnamon, cloves, and perhaps cardamom (Hubert 1881, 133).

Gérard (2006) states that Hubert also contributed to the introduction and propagation of wax apple or *jamalac*, *jamrosat*, longan, and ambarella, or *evi* from Southeast Asia and Polynesia. From the eighteenth to the beginning of the nineteenth century, the need to produce food crop and alternative crops to coffee plantations became inescapable. The issue was the cultivation and profitability associated with some exogenous species introduced since the eighteenth century: coffee plantation, clove tree and nutmeg tree from Moluccas or the Spice Islands, and sugar. Food security was always at stake. Hence the need to introduce species to supplement the diet of the population, especially that of the black slaves. The following quote from Hubert proves that food was since 1792 the major environmental injustice of the colonial insular plantation system. The metabolic balance was based on self-consumption and self-cultivation of grains and legumes. Excluded from this almost autarchic system were slaves and landless people:

The high price of export commodities, on the one hand, and the refusal or uncertainty of the revenue from grains [corn, rice, wheat] and vegetables, on the other, have caused their cultivation to be abandoned; so that, with each inhabitant planting only for his own consumption, and some counting on the surplus crops of others, it happens that we are often short of food for the blacks, and of rice and wheat for ourselves. This year is a terrible example of this; corn sells for 20 pounds a hundred, rice for 50 pounds, and we have not produced, in the whole parish, fifteen thousand grains. It should be noted, however, that we have had neither gale nor drought gale, nor drought, nor rats (Hubert 1881, 140-141).

At the beginning of the nineteenth century, the rise and fall in coffee price and natural hazards forced the abandonment of coffee plantations and the conversion to sugar cane monoculture (Eve 2006; Bankoff and Christensen 2016). Sugar then became a monoculture. From the perspective of commodity frontier the sugar plantation was the paradigmatic case of the “metabolic rift”: Nutrients were pumped out of one [Reunion Island

tropical] ecosystem in the periphery and transferred to another in the core [metropolitan France]. In essence, the land was progressively mined (Moore 2000). In 1834, Betting de Lancastel wrote how the colony of a sugar island implied a total dependence on the metropolis. He said that “all the importance of colonial products is today in the manufacture of sugar. If the colonies had no more products to export, they could not receive anything from the metropolis” (Betting de Lancastel 1836, 14).

In this time, the global French colonial narrative is to try to acclimatize plants to increase yields. The *Jardin d'essaies* were abandoned by the *Jardin Colonial*, expanding the production of food, *culture vivrières*, and later by the *stations expérimentales* to make profitable the harvests (Bonneuil and Kleiche 1993). In the Eden on the land, in La Réunion, it happened too. The model changed entirely to sugar crops, resistant to the cyclones and profitable.

The industrialization and environmental transformation that this plantation implied meant a total change of the tropical environment. Bondage and the labour system, based first on slavery and then on indentured labour, created conditions of environmental and economic culture settled by the long run modern-colonial rules (Stanziani 2014; Campbell 2018). This capitalist and extractive economy was based on dependence on a huge mass of workers from the plantation to their owners at least until the 1920s, following the colonial rule: in all terms, of land-tenure, of the cultivation of gardens (called *jardin*), of sanitary conditions and of hunger and food conditions. The sugar mills also brought with them an economic imperialism, following the purchase of debts by metropolitan corporations, such as *Crédit Foncier Colonial* (Fuma 2001).

In 1900, La Réunion was a classic sugar island. An agricultural system designed for independent subsistence as far as possible, which gave rise to the Spanish and Portuguese sugar islands in the Canary Islands and Madeira (Aznar Vallejo 1984), was transformed during the nineteenth century into an achievable dependence for subsistence.

During the 1920s and 1930s there was an intensification of sugarcane cultivation, despite calls to develop a “reasoned poly-culture” by the Agromonic Services. The report of the Governor of Reunion Island to the Director of the General Agency of the Colonies, dated August 12, 1933, confirms that “sugar cane is, indeed, of all the crops grown in the country, the one that is most resistant to cyclones. This powerful natural factor is sufficient to explain the movement that the economic factor mentioned above only accelerates”.¹

This acceleration also meant that sugar was also seen as a biofuel. In 1932, the island manufactured only 13 hl, 53 of industrial alcohol in 1933;

¹ National Archives of Outermost-ANOM 1933, FM/300/1.

on July 1500 hl were manufactured and the quasi-totality mixed with gasoline, which represents 700 hl of fuel alcohol-gasoline, used already since the beginning of the year. On the other hand, the Governor said, “we are studying very seriously the possible manufacture of absolute alcohol, making it possible to deliver to the trade a fuel with 25 of alcohol and 75 of gasoline, usable for all engines”.²

The agricultural situation of Reunion Island in 1935 was even beyond the export of sugar: “Generally speaking, it is estimated that the distillation of surplus quantities of molasses providing denatured alcohol, usable as fuel, will mitigate to a large extent the imports of hydrocarbons from abroad”.³ In March 1936, the situation was nevertheless unbalanced concerning food crops. As an agronomic report recognized, “[a]t the request of the General Council, the local administration has just created a system of premiums for secondary crops that will allow a return to reasonable mixed farming”.⁴

A small forced transition to island autonomy during the IWW (1940-1942)

Between 1900 and 1946, the date of departmentalization, historical sources show a forced energetic and agro-food transition. The term “forced ecological transition” comes from Emilio Santiago (2017) in his study of Cuba during the *Opción Cero*, following the disappearance of petroleum, fertilizers and chemical pesticides in Cuba when the Soviet Union dissolved in 1991. Reunion Island may have had its own forced ecological transition before Cuba, but with drastic social, sanitary and nutritional results during the Blockade of the Second World War. The old element of the colonial equation, the unbalance between food security and food extraction, had been forgotten and abandoned in forced steps during the industrialization and capitalization of the French Empire. It is today for the Reunionese society the memory of the famine, the long queues in the stores, the rationing charter, the diseases, the malnutrition and the death (Combeau 2002). This gathers with some political nuances of the memories of the Cubans of the *special period*, because their ecological transition was also forced and not chosen. The difference is that agro-ecology was imposed in Cuba and continues to develop today. In Reunion Island the measures that we are going to contemplate below had no continuity solution after the war. On the contrary, it was a return to the colonial model, although at the time of decolonization, or rather, of departmentalization.

² ANOM 1933, FM/300/1.

³ ANOM 1935, FM/300/11.

⁴ ANOM 1936, AGEFOM/300/1.

If we compare the forced transition of Cuba and La Reunion, we observe that in both cases they faced the same challenge: agriculture of edible and non-exportable products. Exports, which had been a priority, took a back seat. Food security always comes to the forefront outside the extractivist capitalist logic and the export of goods. The difference is that in 1940 agro-ecological solutions were unknown and the transition was an autarchic solution with no future beyond subsistence (Santiago 2017). While in Cuba an agro-ecological solution of fertilizer and manure substitution was implemented, in La Réunion we will see that the solution is based on a simple substitution: of crops, hydrocarbons and building materials. The substitution will thus not be a sustainable model, but it is perhaps the first experiment in transitions of economic systems.

In 1940 The Second World War would demonstrate the total and negative unbalance of this sugar economy. Reunion Island remained Petainist, and it was blocked for almost two years. The primary and secondary sources analyzed for this Blockade confirm and give details of a systemic transformation operated also under the agro-food, energy and sanitary systems during the isolation of Reunion Island. These sources add another element: the substitution of cement in the building sector. The forced transition materialized as follows, as we can analyze at the *Bulletin Mensuel de Statistiques Coloniales* (BMSC 1946), Eugène Rousse (1993) and André Le Joubioux (2011):

1. Almost complete substitution of petroleum by a biofuel based on sugarcane alcohol “with 2% petroleum gasoline added as a denaturant” (BMSC 1946, 9). This fuel absorbed an average of nearly 3000 hectoliters of alcohol per month and covered the needs of at least 30 months.
2. 2/3 of the agricultural area was grubbed up for food crops, particularly cassava. But also, soybeans, red beans in association with corn. This 1946 Bulletin, quoting a report, states “this country of monoculture was obliged to grow food crops in order to live, provided that sugar cane was uprooted” (BMSC 1946, 9). André Le Joubioux (2011), in an article, estimates that 70% of the sugarcane fields were destroyed, which also translates into a loss of income from exports.
3. Development of medicinal plants and pills to treat malaria following the shortage of quinine pills. The Director of Health, Raymond Vergès, ordered the planting of cinchona trees, another similar variety, to replace quinine. I quote from the bulletin:

To overcome the shortage of medicines, local preparations based on medicinal plants were used. A makeshift quininization was also carried out by using locally prepared cinchona pills. Nevertheless, the following tables show an increase in the hospital mortality figure; general mortality also underwent a marked increase (BMSC 1946, 9).

4. And, finally, the last transitional element corresponds to the substitution of cement and building materials by, and I quote, “sugar mortar” for the building sector.

This forced transition ended after joining the Free French Forces in 1942, but La Réunion had ration cards until after the war. André Le Joubioux (2011) says that in 1943 the famine still persisted. The new Governor Capagorry, popularly called the Rice Daddy, started a small trade with Mauritius and Madagascar in order to restore the nutrition of the population and gradually overcome the isolation of the metropole and other French possessions. He wrote: “it must strive to survive in a closed economy system” (Le Joubioux 2011, 88). Misery and hunger were widespread.

Commercial dependence on sugar commodity continued in the 1950s. In 1952, some letters transmitted to the Prefect described La Reunion as “a people who groan and starve”.⁵ The island was still considered in 1954 as “a country of mono-cultivation with an almost exclusively industrial character” by the *CFTC* Union.⁶ A plan of *mise en valeur* of the Plaine de Caffres to develop farms and cattle recognized that “the food of this population is very deficient in animal proteins, the average meat consumption per inhabitant is 7 kg per year”.⁷

Another official report from the Prefecture in 1954 confirmed “insufficient food production for its needs, [...] Reunion depends on its imports for almost all of its supplies”.⁸ Worse, in terms of food culture, the texts stated that “the Reunionese people make rice that they do not cultivate and do not know how to cultivate, the basis of their diet”.⁹ According to the French government services, “the demographic problem” was the most serious obstacle to the island’s prosperity. To avoid hunger, since 1955 “expatriation [was] the only future open to Reunion Islanders”.¹⁰ In terms of environmental health, hygiene services also denounced the poor implementation of waste management measures in the sugar industries. The propagation of bagasse, skimmings and molasses from sugar production in the water sources generated enormous situations of incubation of larvae of mosquitoes transmitting malaria, yellow and dengue fevers.

From 1946, the French state and a referendum had established the island as an administrative department, thus emerging from colonial status. The contradiction between a flourishing industry of sugar and hunger cannot be

⁵ Departmental Archives of La Réunion-ADR 1952, 41W2.

⁶ ADR 1952, 41W2.

⁷ ADR 1954, 41W3.

⁸ ADR 1954, 41W5.

⁹ ADR 1954, 41W5.

¹⁰ ADR 1955, 41W5.

more evident than a situation of environmental injustice unexampled in the environmental history of tropical societies.

Conclusion

We have seen how subsistence independence had been abandoned by the end of the seventeenth century in the colonial island economies. This metabolic balance concealed perhaps the greatest environmental injustice that has been little analyzed: hunger. The insufficiency of essential foods contrasts with the increase in sugar exports. This food shortage was essentially suffered by slaves until 1848. Then it became generalized and during the Second World War, the blockade forced the uprooting of sugar cane plantations for the food and health of the reunion people. But it was not enough. The Reunion Island Blockade (1940-1942) is perhaps the first ecological transition in the current sense of the term. It was forced and with drastic consequences. These ideas of substitution were not improvised, the use of alcohols as fuels had already been experimented in Reunion, and the Agronomic Services had been pleading since the 1920s and 1930s for a “return to a reasonable polyculture”.

The socioecological transition cannot be based solely on substitution. As we have seen, in 1940, in La Réunion, the blockade of imports forced the substitution of the system’s sources of materials, food and energy by other endemic sources. Without changing the model, they could not supply the population. The result was widespread famine and an increase in disease. Any socioecological transition in the sugar islands must take into account this history of dependency and environmental injustice based on the export of food thanks to the extraction of food for the islanders, in this case the creole people. The plantation system is the corresponding agrarian system of the industrial Anthropocene. Hence, we endorse Ferdinand’s denomination of Plantatiocene (Ferdinand 2019). In other words, island socioecological transitions maybe have to deal with their own history again: world-system dependence and insular autonomy in the fields of protection to climate change, of ensuring health and nutrition security and developing insular economy to make a welfare system based on social equality, happiness and pleasure.

References

- Aznar Vallejo, Eduardo. 1984. *La integración de las islas Canarias en la Corona de Castilla (1478-1526). Aspectos administrativos, sociales y económicos*. Madrid: Servicio de Publicaciones de la Universidad de Sevilla y de La Laguna.

- Bankoff, Greg and Joseph Christensen (Ed.). 2016. *Natural Hazards and Peoples in the Indian Ocean World*. Hull and Perth: Palgrave MacMillan.
- Betting de Lancastel, Michel-Eusèbe-Mathias. 1836. *Questions coloniales*. Paris: Impr. de Béthune et Plon.
- Bonneuil, Christophe and Mina Kleiche. 1993. *Du jardin d'essais colonial à la station expérimentale 1880-1940. Éléments pour une histoire du CIRAD*. Paris: CIRAD.
- Bulletin Mensuel de Statistiques Coloniales. 1946. *Quelques renseignements statistiques pour la période 1939-1944 sur. La Réunion*, Supplément série études, n° 8. s.d.
- Campbell, Gwyn (Ed.). 2018. *Bondage and the environment in the Indian Ocean world*. London: Palgrave.
- Combeau, Yvan. 2002. "La Réunion dans la guerre: Le gouvernement d'Aubert". In *Le régime de Vichy dans l'Océan Indien. Madagascar et La Réunion (1940-1942)*, édité par Evelyne Combeau-Mari et Edmond Maestri, 53-65. Malesherbes: Sedes.
- Ève, Prosper. 2006. *Histoire d'une renommée. L'aventure du caféier à Bourbon / La Réunion des années 1710 à nos jours*. Saint Denis (La Réunion): Océan éd.
- Ferdinand, Malcom. 2019. *Une écologie décoloniale. Penser l'écologie depuis le monde caribéen*. Paris: Seuil.
- Fuma, Sudel. 2001. *Un exemple d'impérialisme économique dans une colonie française au XIXe siècle. L'île de La Réunion et la société du Crédit Foncier Colonial*. Paris: l'Harmattan.
- Gérard, Gabriel. 2006. *Joseph Hubert (1747-1825) au cœur d'un siècle de multiples turbulences (1725-1825)*. Sainte-Marie (La Réunion): Azalées Éditions.
- Grove, Richard. 2013. *Les îles du Paradis. L'invention de l'écologie aux colonies 1600-1854*. Paris: La Découverte.
- Hubert, Joseph. 1881. *Papiers de Joseph Hubert publiés par M. Emile Trouette*. Paris: Saint-Denis.
- Le Joubioux, André Hervé. 2011. "L'île de La Réunion dans la Seconde Guerre mondiale". *Revue historique des armées* (263): 81-92.
- Moore, Jason W. 2000. "Sugar and the Expansion of the Early Modern World-Economy: Commodity Frontiers, Ecological Transformation and Industrialization". *Review Fernand Braudel Center* 23: (3): 409-33.
- Quenet, Grégory. 2013. "Protéger le jardin d'Eden", présentation de *Les îles du Paradis. L'invention de l'écologie aux colonies 1660-1854*, editado por Richard Grove, 77-121. Paris: La Découverte.
- Rousse, Eugène. 1993. *Combat des Réunionnais pour la liberté. I*. Saint Denis (La Réunion): Editions CNH.
- Santiago, Emilio. 2017. *Opción Cero. El reverdecimiento forzoso de la Revolución cubana*. Madrid: Los Libros de la Catarata.
- Stanziani, Alessandro. 2014. *Sailors, Slaves, and Immigrants. Bondage in the Indian Ocean World, 1750-1914*. New York: Palgrave MacMillan.