

Rachel Carson Center

Perspectives

How to cite:

McCook, Stuart. "Prodigality and Sustainability: The Natural Sciences and the Environment." In: "New Environmental Histories of Latin America and the Caribbean," edited by Claudia Leal, José Augusto Pádua, and John Soluri, *RCC Perspectives* 2013, no. 7, 89–94.

All issues of *RCC Perspectives* are available online. To view past issues, and to learn more about the Rachel Carson Center for Environment and Society, please visit www.rachelcarsoncenter.de.

Rachel Carson Center for Environment and Society
Leopoldstrasse 11a, 80802 Munich, GERMANY

ISSN 2190-8087

© Copyright is held by the contributing authors.

SPONSORED BY THE



Federal Ministry
of Education
and Research

Deutsches Museum 



Stuart McCook

Prodigality and Sustainability: The Natural Sciences and the Environment

The natural sciences are but one of many different ways of understanding nature. Over time, the peoples who lived in Latin America's diverse landscapes developed complex and varied ways of understanding the world around them. The indigenous groups of the Americas had evolved hundreds of local environmental knowledge systems. The European conquest added new kinds and new layers of local environmental knowledge, from the Afro-Latin American farmers who grew rice in lowlands, to mestizo cattle ranchers, to white creole plantation owners producing crops for export. While the natural sciences had been introduced to the Americas during the conquest, it was during the nineteenth century that Latin America's political and intellectual elites began to systematically enlist the natural sciences to survey the natural world and (ideally) use nature to promote national development. For much of the nineteenth and twentieth centuries, the main goal of the sciences was to keep Latin America's "prodigal" landscapes as productive as possible. Since the mid-twentieth century, a new countercurrent has emerged, which focuses on using science to conserve biological diversity, and to promote sustainability.

During the long nineteenth century (roughly from the Haitian Revolution to World War I), Latin America's colonial and national governments used the natural sciences to promote the prevailing liberal policy of export-led development. The early nineteenth-century wars of independence marked the almost complete decolonization of Spanish and Portuguese America; only Cuba and Puerto Rico remained in Spanish hands. Most nations (and even the remaining colonies) pursued economic development through commodity exports, producing tropical goods for industrializing markets in the Global North, which had seemingly insatiable appetites for Latin American products. Latin America's elites shared in the myth of "prodigal" nature, which understood the region's natural resources as being, for all practical purposes, infinitely abundant and inexhaustible. These resources were to be used to promote national economic development: "Sin azúcar," went the Cuban saying, "no hay país" ("without sugar, there is no nation"). By the end of the nineteenth century, Brazil produced four times as much coffee as the rest of the world combined, and Cuba was the world's largest producer of

sugar. This ideology of prodigality was, perhaps, understandable when looking at the vast landscapes of Brazil. But even the elites in comparatively small places like Cuba shared the same vision.

Early in the nineteenth century, states hired naturalists to produce maps of the new nations, and to conduct inventories of their flora, fauna, and other natural resources. These natural history inventories were meant to be practical; states wanted inventories of existing and potential export commodities, and other useful natural resources. Between about 1880 and 1930, almost every nation in Latin America produced a national flora—an inventory of the nation’s plants. These floras were intended to be comprehensive; so naturalists explored their national territories, making arduous journeys to collect plants and to map territories. They also attempted to synthesize all of the botanical knowledge about the nation’s nature held in museums and botanical gardens abroad. These naturalists also selectively (and often silently) appropriated and incorporated local environmental knowledge from indigenous groups, farmers, and others. These inventories generated some unexpected insights about Latin America’s environments. Some landscapes in tropical Latin America were home to a diversity of species that far surpassed expectations. While the word “biodiversity” was not coined until later in the twentieth century, the concept had its roots in this period.

By the late nineteenth century, states also enlisted the natural sciences to address emergent environmental problems, many of which had been caused by intensive commodity production. It became apparent that many of Latin America’s landscapes were not as abundant as earlier observers had thought. The spectacular expansion in agricultural production had produced a host of new environmental problems. Massive deforestation had robbed soils of their nutrients. And many of the region’s leading crops suffered from an unprecedented wave of diseases and pests, a consequence of intensified production, and also of the accelerated circulation of organisms across the Global South. These problems required specialized expertise, opening up a new space for the agricultural sciences. Agricultural science had emerged as a research discipline in early-nineteenth century Germany, and agricultural experiment stations had quickly spread across Europe and North America. Agricultural sciences came to include a wide range of scientific disciplines, including agricultural chemistry, economic entomology, plant pathology, and plant acclimatization and breeding. The coffee planters of São Paulo in Brazil organized a state experiment station in the late 1880s to focus

on the problems of coffee production (Dean 1989). Other agricultural experiment stations soon emerged across Latin America.

For the seven decades between World War I and the end of the Cold War, Latin American states—across the political spectrum—enlisted scientists in projects of state-led modernization. They hoped that prodigal science could do what prodigal nature could not. Agricultural experiment stations in Latin America assumed a newly important role beginning in the 1920s and 1930s. In 1938, the Colombian Federation of Coffee Growers organized a Coffee Research Station (Cenicafé) to study all facets of coffee production. Agricultural scientists tried to help Latin America's farms deal with an increasingly varied and virulent range of diseases and pests. Experiment stations in Cuba and Puerto Rico, for example, introduced new sugar hybrids from Java to mitigate the impact of the sugarcane mosaic virus. North American scientists working for the United Fruit Company worked to combat the Panama Disease, which threatened banana production in Central America.

Beginning in the 1950s, Latin American scientists (along with agricultural scientists across the globe) promoted the “technification” of agriculture, to dramatically increase agricultural productivity. Significantly, these efforts at improving productivity focused on food crops as well as cash crops. These new “Green Revolution” technologies included packages of hybrid seeds, and chemical fertilizers, fungicides, and pesticides. Producers of traditional export crops also technified their farms, often under the guidance of scientists and extension agents from national experiment stations and government agencies, such as Brazil's EMBRAPA (Brazilian Agricultural Research Corporation), founded in 1973. For example, coffee farmers eliminated shade trees, and replaced their old

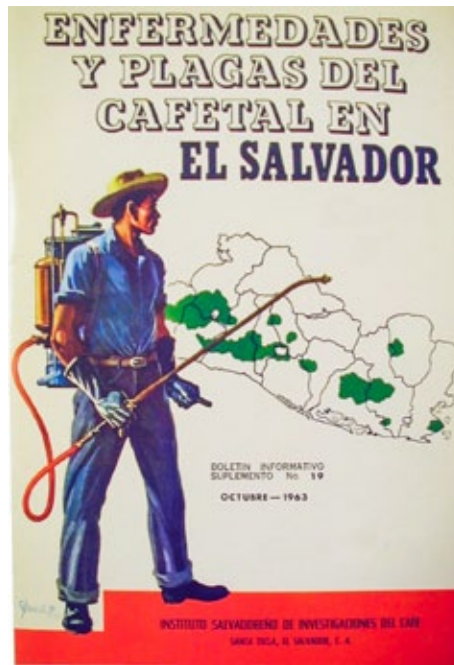


Figure 1: A Salvadoran coffee-sprayer, from an agricultural journal from El Salvador, giving a heroic depiction of the new agricultural technologies being introduced to Latin America after World War II. Source: Abrego, L, J.A. Castello, and L.F. Trigueros. 1963. *Enfermedades y plagas del cafetal en El Salvador*. Boletín Informativo Suplemento no. 19. Santa Tecla, El Salvador: Instituto Salvadoreño de Investigaciones del Café.

varieties of coffee with new hybrid “sun” coffees (many of which had been developed in Brazil). It appeared, then, that prodigal science could replace prodigal nature. Over the short term, technification did produce tremendous spikes in productivity. But these increases often had tremendous economic and ecological costs.

While the agricultural sciences focused on technification, the more traditional natural history—associated with inventories and taxonomies—expanded to encompass newer experimental approaches to field biology, which ultimately evolved into the science of ecology. These new ecological sciences sought to understand patterns and processes in the natural world, the distribution of species, and interactions between species and their environments. Small communities of naturalists continued to conduct inventories and ecological research, and also to lobby publicly for the importance of natural history research. From the mid-1920s to the mid-1940s, for example, biologists at Brazil’s Museu Nacional made concerted efforts to highlight the importance of biology to the Brazilian public and the state (Duarte 2010).

Conservation and preservation of nature—particularly forests—became key themes in the ecological sciences during this period. Foresters expressed growing alarm at the deforestation and destruction of wild environments. They were leading voices in encouraging states to create national parks and nature preserves. Under the administration of Lázaro Cárdenas (1934–1940), for example, the Mexican government created 40 national parks to foster the rational management of nature, and also the promotion of social justice. Other national parks were created across Latin America in the following decades, especially in the 1960s and 1970s, although many were little more than “paper parks” that existed in name only. Scientists and states alike usually conceived of conservation in utilitarian terms. Their primary concern was about the long-term use of natural resources for the benefit of people. If nature was no longer prodigal, it could at least be kept productive through careful stewardship managed by scientists. Beginning in the 1960s, ecology (as a discipline) gained renewed global importance because of the emergence of local and global environmental movements. In the Global North, Rachel Carson’s *Silent Spring* (1962) mobilized an environmental movement concerned about the impacts of agricultural modernization—particularly the impact of agricultural chemicals on people, animals, and landscapes. In the following decades, the ties between ecologists and environmental movements grew stronger and expanded to include concerns such as industrial pollution and deforestation.

The end of the Cold War and the advent of the debt crisis and structural reforms (beginning in the late 1980s and continuing into the 1990s) marked the end of the short twentieth century and the beginning of a new period in Latin American history. Most Latin American countries gradually made the transition to democracy. At the same time, structural reforms imposed by international lending agencies forced many indebted Latin American states to slash public spending. Scientific research institutions had their budgets cut or were closed altogether. All of this took place just at a moment when global attention was focused on Latin American environments. In 1992, Rio de Janeiro hosted the United Nations Conference on Environment and Development, which included representatives from 170 states, and several thousand NGOs. This convention marked a major shift in emphasis: beginning in the 1990s, the theme of sustainability became a central focus for research in the environmental sciences, both pure and applied. Another shift, related to this, is that the environment itself became an object of concern and debate. In previous generations, people addressed environmental issues as a way of addressing political and economic issues, rather than as problems on their own terms.

Biological diversity became a key focus of international environmental movements in the 1980s and 1990s. Conservation scientists, who had been in the backwaters of the environmental sciences a few decades before, became central to the discipline. The global debate over biodiversity (and deforestation) centered around the destruction of the Amazonian Rain Forest, which had been opened up and colonized as part of modernization plans by the Brazilian dictatorship of the 1960s, 70s, and 80s. The discourse of sustainability also made its way into the agricultural sciences. Sustainability in agriculture became just as important as productivity, which had dominated agricultural research for most of the previous two centuries. In some niche industries, particularly in high-value luxury commodities directed at “ethical” consumers, such as coffee, agricultural scientists helped develop organic farming practices. In the 1990s, Cuba’s agricultural scientists helped the country adopt large-scale organic agriculture in the face of catastrophic shortages of petroleum and chemicals. While organic agriculture has gained popularity under certain conditions, conventional agriculture is still widespread.

The paradigm of sustainability has not supplanted the productivist and utilitarian paradigms of the nineteenth and twentieth centuries. Some countries, like Brazil, Costa

Rica, and Bolivia have made considerable headway in protecting their biological diversity, through legislation and the creation of viable parks and biosphere preserves. But these protections are under constant threat. And while agricultural researchers pay ever more attention to sustainability, many of the practices of high modernist agriculture persist. The rapid and vast expansion of soybean agriculture across southern South America involves many of the hallmarks of modernist agriculture, including the use of genetically modified organisms, agricultural chemicals, and large-scale landscape change. This modern “Republic of Soy” encompasses parts of Southern Brazil, Bolivia, Paraguay, Uruguay, and Argentina. Although the discourse of sustainability now pervades the environmental sciences, a considerable amount of research in Latin America still focuses on productivity and prodigality.

Selected Sources

Dean, Warren. 1989. “The Green Wave of Coffee: Beginnings of Tropical Agricultural Research in Brazil (1885–1900).” *The Hispanic American Historical Review* 69 (no. 1): 91–115.

Duarte, Regina Horta. 2010. *A biologia militante: O Museu Nacional, especialização científica, divulgação do conhecimento e práticas políticas no Brasil, 1926–1945*. Belo Horizonte: Editora UFMG.

Evenson, R. E., and D. Gollin. 2003. “Assessing the Impact of the Green Revolution, 1960 to 2000.” *Science* 300 (5620): 758–62. doi:10.1126/science.1078710.

McCook, Stuart. 2002. *States of Nature: Science, Agriculture, and Environment in the Spanish Caribbean, 1760–1940*. 1st ed. Austin: University of Texas Press.

Wakild, Emily. 2011. *Revolutionary Parks: Conservation, Social Justice, and Mexico’s National Parks, 1910–1940*. Tucson: University of Arizona Press.