

## “ROBBING THE EARTH OF ITS CAPITAL STOCK”

An Introduction to George Waring's *Agricultural Features of the Census of the United States for 1850*

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In his influential *Letters to the President on the Foreign and Domestic Policy of the United States*, U.S. economist Henry Carey (1858) quoted at length from a talk by an “eminent agriculturist” who had provided rough calculations for the whole United States of the loss of soil nutrients resulting from the failure to recycle organic matter. In that statement, as quoted by Carey, the dire, long-term ecological consequences of the shipment of food and fiber in a one-way movement from country to town were raised:

What with our earth-butcherly and prodigality, we are each year losing the intrinsic essence of our vitality. . . . The question of the economy should be, not how much do we annually produce, but how much of our annual production is saved to the soil. Labor employed in robbing the earth of its capital stock of fertilizing matter, is worse than labor thrown away. In the latter case, it is a loss to the present generation—in the former it becomes an inheritance of poverty for our successors. Man is but a tenant of the soil and he is guilty of a crime when he reduces its value for other tenants who are to come after him. (quoted in Carey, 1858, pp. 54-55)

In 1859, the great German agricultural chemist Justus von Liebig (1859, pp. 175-178, 183, 220) requoted Carey's “eminent agriculturist” in full, in an argument in his *Letters on Modern Agriculture* that was to mark the beginning of a major campaign by Liebig to address the ecological degradation associated with the robbing of the soil of its nutrients. Such robbery occurred not simply under what Liebig called the “spoliation system” of agriculture, identified in particular with the “open robbery” characteristic of American farming, but also under the “rational agriculture” of the British high farming model, which was ostensibly based on restitution of soil nutrients but in reality was nothing but “a more refined species of spoliation.” Liebig grounded his critique in the empirical estimates of Carey's “eminent agriculturist” and reinforced this with Carey's argument on the effect of long-distance trade in disrupting what Marx (1976) was later to call the “metabolic interaction between man and the earth” (p. 637; see also Perelman, 1999 [this issue]).

Liebig was to develop these criticisms still further in the 1862 edition of his great work, *Organic Chemistry in Its Applications to Agriculture and Physiology*. The entire argument as developed by Liebig (and to some extent Carey) was then taken



up by Marx (1981, p. 949), who made the “rift” in the human metabolic relation to the soil a crucial component of his critique of capitalist society. Marx, in a manner similar to Carey’s “eminent agriculturist,” declared that human beings were mere possessors and beneficiaries of the soil, who “have to bequeath it in an improved state to succeeding generations as *boni patres familias* [good heads of the household]” (p. 911). (In Marx’s case, however, these ideas were originally inspired by Prudhon’s [1840/1994, pp. 82-84] *What Is Property?*—a work that exerted a strong influence on the development of his thought.)

Although the history of soil science has long recorded these developments—particularly with respect to the role of Liebig (and of Marx) in the development of ecological analysis of the soil—no one has ever ascertained who Carey’s (and Liebig’s) “eminent agriculturist” was, or whether the original source could be located. The answer lay in another long-forgotten work, Carey’s (1858/1867) *Principles of Social Science*, where he again quoted very extensively from the same talk by his “eminent agriculturist,” this time however saying that the extracted paragraphs came “from a valuable paper by Mr. Waring read before the Geographical Society of New York” (pp. 212-215).

With this clue, I found a talk by George E. Waring, Jr. given at a meeting of the Geographical Society in New York on January 11, 1855, and later published in 1857 in the *Bulletin of the American Geographical and Statistical Association*.

George E. Waring, Jr. (1833-1898) is known as one of the greatest figures in the history of environmental struggles in the United States. Yet, up until now it was believed that Waring’s important environmental contributions were confined almost exclusively to a period much later in his life in which he emerged as the leading sanitary engineer in the United States and the principal advocate and practitioner of the cleaning up of cities within the urban conservation movement. When he delivered the talk from which Carey (and Liebig) quoted so extensively, Waring, despite the “eminence” that Carey attributed to him, was only 22 years old. Moreover, his work was centered not on cleaning up the city (from which his later fame derived) but on the ecological degradation of the earth.

Waring’s early years were governed by what Merchant (1989, pp. 198, 205-211) has called “the capitalist ecological revolution” in New England that overthrew the earlier colonial system of agriculture and replaced it with one based on capitalist market relations and the industrial model—a change in agriculture that occurred between the end of the American Revolution and 1860 but which was particularly intense following the introduction of mechanistic approaches to chemistry under the influence of Liebig in the 1840s. Waring was trained in agricultural chemistry and engineering under the renowned scientific agriculturist James J. Mapes. Waring devoted his early and mid-20s to scientific agriculture, running the farms of Horace Greeley and Frederick Law Olmsted, and lecturing before farmers’ groups in the winter. He wrote his *Elements of Agriculture* in 1854. Later, when Olmsted, the great landscape architect, began to work at building Manhattan’s Central Park, he enlisted Waring as agricultural and drainage engineer.

During the Civil War, Waring joined the Northern war effort and rose to the rank of colonel in the Missouri Cavalry of the United States Volunteers. After the war, he returned for a time to scientific agriculture, but eventually shifted his efforts from the scientific reform of agriculture to cleaning up the cities, specializing in the areas of municipal engineering and sanitation.

At the time, U.S. cities were characterized by overflowing tenements, congested streets, and gargantuan refuse problems. The water supply was polluted with all forms of waste and excrement, the air was foul with smoke, and the streets them-

selves were often filled with all manner of human and animal refuse. Waring achieved considerable fame in 1879-1880 through his role in introducing the "separate system" or "Waring system," as it was called, of urban sewers, whereby rain-water was separated for the first time from raw sewage. He later achieved national prominence after designing a separate system for Memphis, Tennessee, which had suffered from many years from inadequate sewers and yellow fever epidemics. This was followed by a remarkable performance as New York City's street cleaning commissioner, responsible for collecting and disposing of all wastes in the city, in 1895-1898. During this period, Waring also wrote prolifically, mainly on problems of urban sanitation. In 1898, following the U.S. takeover of the island in the Spanish-American War, President William McKinley sent Waring to study sanitary conditions in Cuba and to combat yellow fever. Waring contracted yellow fever in Havana and died shortly after returning to New York. Five thousand mourners showed up at his funeral (Melosi, 1977, 1981).

The comprehensiveness of Waring's vision at the end of his life is revealed in some of his writings from 1895 to 1897. In an article titled "The Disposal of a City's Waste" that he wrote for the *North American Review* in 1895, Waring (1977a) began by pointing out that "ever since the beginning of Liebig's agricultural writings, more than half a century ago, the quasi scientific world has been seeking means to turn the wastes of urban life into wealth; and has been ascribing the downfall of empires to the pouring of those wastes into the sea" (p. 19). Nevertheless, most practical experiments in England, inspired by Liebig, to turn sewage into wealth through sewage farming had, Waring conceded, thus far proven unprofitable, although nonetheless worth pursuing. Where waste products were not already diluted with large amounts of water from which they have to be separated, he argued, the possibilities for profitable recycling of the waste (turning waste into wealth) were much greater. Waring himself had instituted in New York the first plant in the United States for sorting urban refuse.

A more utopian vision was propounded by Waring (1977b) in his 1897 talk, "New York, A.D., 1997: A Prophecy." Describing the prospects of a city that might rise to a population of 20 million or more, he speculated on the future of the city's transportation, hoping that some solution would have offered itself. "A quarter of a century ago no one would have believed that old and young, rich and poor, would be flying about our streets and over our country roads on rubber tired bicycles. It would have been as absurd to predict then what we are now so familiar with as to predict now that there will be some safe and universal method of aerial or subterranean mode of conveyance." At any rate, it was to be expected that "automobile carriages and trucks" would "entirely supplant the vehicles of today." Pointing to an experiment in which he had been involved in Newport in 1894, Waring argued that sewage could be "purified to the drinking water standard—bright, sparkling, odorless and palatable." Electricity would replace the burning of coal and wood for fuel, he argued, freeing the houses and streets of ashes and dust. All of these beneficial effects, however, would arise only as a result of an effort to reform both education and society. Voicing the views of the Progressive movement, Waring argued: "Long before the great city of the future shall have approached the lines laid down above, *its people will be a different people from what they are now, and its rulers will be different rulers*" (pp. 26-30).

In recent decades, environmental historians, most notably Melosi (1977), have rediscovered Waring as "a major precursor of modern environmentalists" (p. 5). Waring has stood as a reminder, along with other figures such as Jane Addams, Florence Kelley, Alice Hamilton, and Upton Sinclair, of the urban environmental

struggle during the Progressive era that foreshadowed many of today's struggles over environmental justice.

Waring is a major figure of U.S. environmental history; however, the role that he played in his early years, when he was already inspired by Liebig and the problem of waste—but in the wider rural/urban context of the recycling of soil nutrients—has remained unknown. Nor has it been recognized how Waring, through the agency of Carey, served to influence the European discussions by reinforcing Liebig's perception of the ecological crisis of the soil. In Waring is to be found an environmental figure who over the course of his lifetime bridged the concerns represented by what Marx called the antagonistic relation between town and country, reflected in the "rift" in the "metabolic" relation of human beings to the soil.

Waring's (1855/1999 [this issue]) talk on the "Agricultural Features of the Census of the United States for 1850" was delivered only a year before Congress passed the Guano Island Act, setting the stage for U.S. imperialist expansion as U.S. capitalists spread across the globe searching for deposits of guano (accumulated dung of sea birds) with which to replenish nutrients lost to the soil—resulting eventually in the seizure of 94 islands, rocks, and keys around the globe, 66 of which were officially recognized by the Department of State as U.S. appurtenances and 9 of which remain U.S. possessions today (Skaggs, 1994).

Although demonstrating the radical-root nature of Waring's (1855/1999) outlook, the "Agricultural Features of the Census of the United States for 1850" is first and foremost an attempt to evaluate the condition of agriculture in the United States based on statistical evidence from the census. In this regard, Waring's analysis represents an important historical document, which we have decided to reprint in full. It is in the last third of Waring's speech, however, that his critical contribution lies. It is here that Waring addresses the deficiencies of the census in grasping the real condition of agriculture. The census provides no direct information on "the amount of inherent fertilizing matter removed from the soil by the production and ordinary use of crops" (p. 305).

This is a critique of the agricultural features of the census that insisted on the need to calculate not only economic production in agriculture but also the ecological losses to the soil; that is, the true condition of agriculture. "No soil is inexhaustible. The fertility of the earth's surface depends on the presence in the soil of certain materials which are employed in the growth or formation of plants. These materials do not act externally. They enter the structure of the plant, and become incorporated with its parts, thus forever to remain until liberated by the decomposition of its tissues" (p. 305). Providing, as we have seen, rough estimates of how these nutrients were being lost to the soil, Waring pointed to the "earth brutality and prodigality" that this represented, the fact that this meant "the robbing of the earth of its capital stock," and the necessity for sustainable development that would maintain the earth for future populations.

In using capital stock in this sense, Waring prefigured much of contemporary environmental economics. Yet, he was not entirely alone in his day in developing this outlook. Similar arguments had been voiced (although without the same eloquence or scientific background) a few years earlier in 1853 by Carey in *The Slave Trade Domestic and Foreign*:

The earth is a great labour-savings' bank, and the value to man of all other machines is in the direct ratio of their tendency to aid him in increasing his deposits in that only bank whose dividends are perpetually increasing, while its capital is perpetually doubling. That it may continue for ever to do so, all that it asks is that it

shall receive back the refuse of its produce, the manure; and that it may do so, the consumer and the producer must take their places by each other. (Carey, 1853/1967, p. 48)

Significantly, Carey sent a copy of this book to Marx, whom he had quoted (Marx & Engels, 1975, pp. 78-79).

Waring's own transcendent intellect is reflected above all in the fact that he went on to suggest a reform in the census that would require that these ecological losses be taken into account—a stance that can be seen as a precursor of present-day demands for environmental accounting. Written almost a decade before Marsh's great work, *Man and Nature* (1864), often thought of as constituting the intellectual fountainhead of the conservation movement in the United States, Waring's discussion of the ecological aspects of the "metabolic relation" between human beings and the soil (to use Marx's later expression) stands as a powerful reminder of the extent of the ecological crisis/revolution evident in the antebellum period (see Foster, 1997; Perelman, 1999), and of the struggle already being waged to develop a more harmonious and sustainable relation to the earth.

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