Business history has never paid much attention to the environment. Brushing aside the firm’s reliance and impact on the natural world, early business historians zeroed in on the role of the entrepreneur in big business’s rise. They found it easy to truncate, marginalize or altogether ignore the physical processes by which the stuff of nature—“raw” materials—was carved or coaxed out of mountains, forests, and deserts, channeled into factories and squeezed and cajoled into commodities. They scarcely considered the ever-changing varieties of “waste” generated by businesses and customers, which so often infiltrated, polluted, and otherwise altered the world beyond factory and office. They devoted equally little attention to the effects of resource extraction and use on plants, animals, land, air, or water, much less entire ecosystems and climate.¹

¹ Much of this early work gave no attention to environmental problems even though it was highly critical of the industrialists who created big business. For example, Matthew Josephson’s *The Robber Barons: The Great American Capitalists, 1861-1901* (New York, 1934), one of the early classics in American history, bitterly critiques the architects of American big business without specifically addressing their business’s many harmful environmental impacts. This failure is particularly clear in books dealing with John D. Rockefeller and the development of the environmentally degrading oil industry. See for example, Ida M. Tarbell, *History of the Standard Oil Company* (New York, 1925) and Allan Nevins, *Study in Power: John D. Rockefeller, Industrialist and Philanthropist* (New York, 1953). See also Peter D. A. Jones, ed., *The Robber Barons Revisited* (Boston, 1968).
The emergence of Chandlerian institutional history perpetuated this neglect. The organizational approach encouraged business historians to focus on the dynamics of corporate management and the internal evolution of the firm. Its adherents impressed upon their colleagues the value of analyzing how corporate managers responded to market conditions beyond the firm’s walls, through strategies and organizational structures. Although there was nothing in this approach that would have prevented them from examining how firms organized themselves to manage natural resource utilization, pollution control, or any other aspect of the interface between the corporation and the environment, Chandler and his followers chose to concentrate on matters relating to vertical integration and the evolution of the large, diversified, multi-divisional industrial corporation. In the process of investigating these admittedly important aspects of the rise of big business, they continued to ignore the subject of big business’s dependence and impact on the natural world. Their inattention persisted despite the fact that they wrote at a time of mounting public outcry over industrial pollution and increasing conflict between business and an ascendant environmental movement.

We hope this special issue of the Business History Review will impress upon business historians the richness, relevance, and importance of questions about business’s interface with the natural environment. An environmentally-minded business history will, we contend, restore crucial materialist dimensions to the field: not just the concreteness of money and markets, but of fire, rock, dust and smoke. We also believe there are few
more promising avenues for integrating business history into larger historic panoramas or for ushering the field through a cultural turn.

Business historians can profit in this regard from terms and modes of analysis that have evolved in the field of "environmental history." We also have an auspicious opportunity to help mold and deepen the environmental history enterprise. Since the founding of the American Society for Environmental History and the establishment of its journal in the mid-1970s, environmental historians have evolved their own ambitious agenda. The most sweeping statements of purpose—such as that by Donald Worster on "the role and place of nature in human life" and William Cronon on "placing nature in [human] history"—have helped make it one of the mostly broadly integrative historical projects around. Environmental historians have developed an ever widening and more sophisticated understanding of "nature's" meanings and the variety of ways it has figured into human life and history.

Oddly enough, however, despite this broad conception of their field, our colleagues in environmental history have shown almost as much reluctance to tackle business's environmental relations as business historians have. Both fields have sorely neglected the borderlands between them. Path-breaking environmental historians have launched a harsh critique of capitalism that has entailed surprisingly little scrutiny of managers or corporations. Early on, most environmental historians concentrated on the history of wilderness, agriculture, the conservation movement, or modern environmentalism, where they believed nature and its defense were most obviously found. Pre-occupied with setting out a distinctive field of historical endeavor in relation


to frontier and Western history as well as environmentalism itself, most assumed that they knew the history of the large corporation all too well—its inner workings as well as its outwardly impacts. They envisioned a monolithic nineteenth- and twentieth-century economic system that offered little entry point or incentive for closer study of individual companies, businessmen, or even industries as a whole. A 1990 *Journal of American History* roundtable presenting the views and agendas of major environmental historians offered virtually no discussion of the shift to corporate capitalism that had become the central preoccupation of business history. 8

Astonishingly, even the worst ravages of industry have gone little studied by either business or environmental historians. As Joel Tarr and Jeffrey Stine pointed out last year in a *Technology and Culture* review, historians “have on the whole neglected not only worker safety but also the environmental consequences of industry and manufacturing.” Most histories of the iron mining and iron and steel manufacturing, for example, “gloss over or totally ignore” the industry’s environmental repercussions. 9 Until recently, historians of the chemical industry barely touched on its devastating mid-century environmental impacts, despite how these helped compel the stricter environmental regulations of the 1970s. 10

Things have started to change, however, both in business history and environmental history. First, as “organizational” lines of scholarship have matured and the limits of the Chandlerian model have become apparent, younger business historians have cast about for fresh lines of inquiry that can carry the field into new realms. The recent Hagley conference on the future of business history featured a variety of efforts to define new research agendas and analytical models, via newer and less functionalist sociological think-
ing about organizations, the economics of imperfect information, structurationist theory, and post-structuralist cultural analysis. Among these proposals was an appeal by one of us to make “industrial ecology” the starting point for a more environmental business history.\textsuperscript{11}

Second, changing attitudes in the business and regulatory worlds and in the fields of engineering and economics have bolstered the relevance of environmental issues to business history. The new generation of managers now taking the helm of corporations includes many men and women who grew up with the environmental movement and arguably share its goals—who seek ways to reduce business’s harmful environmental impacts while maintaining or enhancing their firm’s competitive advantage. “Green” packaging, eco-tourism, organic foods, and other environmentally friendly forms of consumption have acquired a significant presence in the market place.\textsuperscript{12} EPA regulators now hope to expand markets for pollution or emissions credits and to step up programs encouraging voluntary pollution reductions, beyond what is required by law.\textsuperscript{13} Industrial engineers have pioneered the concept of industrial ecology and, following its precepts, have joined with managers at some corporations to begin developing programs in pollution source reduction, design for environment, industrial waste exchanges, product remanufacturing and other innovative technologies and strategies for reducing industry’s environmental impacts.\textsuperscript{14} Economists interested in bridging the gaps between their field and natural ecology have joined


\textsuperscript{12} For references on recent trends in green packaging, ecotourism, and organic food industry, see N.H. Lampkin and S. Padel, eds., The Economics of Organic Farming: An International Perspective (Oxon, 1994).


together to inaugurate an “ecological” economics and have extended analytic approaches developed to assess the value of natural resources to measure, instead, the value of entire ecosystems like forests and wetlands.\textsuperscript{15}

Related developments in environmental history and the environmental movement have encouraged environmental historians to move in similar directions. During the Clinton years, the environmental community has evolved in ways that mirror the changes taking place in business. Environmentalists have become increasingly intrigued with market-oriented ways of thinking and regulating. Whether this revival of the market signals a conservative turn in environmentalism or a frustration with legally mandated and administered controls, it has prompted growing numbers of environmental historians as well as environmentalists to start rethinking the relationships between business, markets, and environmental change.\textsuperscript{16} Just as importantly, an “environmental justice” movement among working class and ethnic minorities has launched a powerful and influential critique of inequities in the distribution of what are predominantly corporate environmental impacts.\textsuperscript{17}

Like business historians, environmental historians are also re-examining their field’s existing paradigms, seeking to recast the boundaries of their discipline. Growing frustrated with environmental history’s longstanding focus on farms, forests and wilderness and fortified by a dawning recognition of the much wider


scope of the “natural,” many environmental historians have begun to gravitate away from the study of pristine environments toward those more thoroughly and unmistakably shaped by human hands. Environmental historians, especially younger ones, have explored a wide variety of subjects beyond the field’s original purview—including the environmental dimensions of industrial development.\textsuperscript{15}

In short, at the start of the new millennium, both business and environmental historians have arrived at the same juncture: they’ve discovered the need for careful and exacting scrutiny of the firm’s environmental relations. The first group stands poised to inject nature into business history, while the second is ready to inject business into environmental history. An unprecedented opportunity for collaboration now presents itself. After decades of separation, business historians can join with environmental historians in considering the role and place of nature in business development. We find this possibility extremely exciting and important. Because we are writing for the \textit{Business History Review}, this essay primarily addresses this opportunity from the perspective of business historians. But we also hope that environmental historians will hear our message about the need for and value of collaboration.

In our view, research into the environmental dimensions of business offers just as much potential for business historians as the cultural dimensions whose study Philip Scranton, Roger Horowitz, and others urged upon us at the recent Hagley conference on the “Future of Business History.”\textsuperscript{19} Moreover, we believe that study of these two aspects of business life should be closely connected. Like scholars in a variety of culturally-inclined fields who have recently endeavored to bring “nature” or “materiality” itself more into their scope of analysis, we think that efforts to understand the environmental dimensions of human activity must inevitably engage the realm of the symbolic. From anthropology to science studies, movements are underway to break down the nature/culture divide that has structured...
inquiry in these and other disciplines for so long. New coinages like “nature-culture” aim to capture this sense of interconnection, to draw attention to the idea that you can’t study one without broaching the other. Inquiries into culture lead into questions about nature, and vice versa. To realize the fullest and deepest potential of this revisionist moment in our field, we must extend analysis of the environmental history of business to the symbolic as well as the material components of business’s environmental relations.

The remainder of our introduction to this special issue of the *Business History Review* on “Business and the Environment” sketches out the rudiments for an “ecocultural” approach to our discipline. We offer a few pointers and prescriptions to guide those interested in working at this intersection of fields and questions. We challenge our readers to develop their own agendas as well. Our main purpose is to foster new ways of re-connecting our histories of the firm with narratives about both the natural and cultural worlds within which firms are embedded.

A first step in opening the borderlands between environmental and business history is to acknowledge that we have, as a discipline, tended to treat industrial impacts like pollution as well as most other environmental dimensions of business activity as if they were what economists call “externalities.” Externalities are “social costs” or “spill-over effects” of economic activity, which may impact buyers and sellers as well as bystanders in a given economic transaction, but are not priced into the transaction itself. As such, they are distinct from the conventional economic costs internalized by the price mechanism of the market system in which business managers operate. And as such, they have long been widely accepted as naturally outside or beyond the scope of the businessman’s economic calculations, unless artificially internalized into the market by regulation.

We do well to recall that the externality concept itself is only one latter-day tool by which economists have struggled to comprehend how markets handle or mishandle environmental questions. Classical econ-

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omists from Adam Smith to David Ricardo devoted considerable attention to the supply and value of arable land but neglected other natural resources as well as what later became known as “environmental amenities.” Later, not least through the influence of Karl Marx’s labor theory of value, an emphasis on capital and labor as the most important factors in production increasingly submerged questions about resources and supply in the work of many economists. With the neoclassical revolution, Alfred Marshall and A.C. Pigou opened the door to the externality concept through arguments that production gave rise to unpaid “social costs,” costs imposed both on the transacting parties and the rest of society that were not internalized in prices. Only after World War II, however, did economists adapt this notion to pollution and other kinds of environmental degradation, through coinage of the “externality” concept and through innovations in resource economics. Much of this flowering of economic thought about the environment, from Ronald Coase to Kenneth Arrow and Paul Portney, has had a strong public policy orientation. It has focused on theorizing about how society structures legal rules and regulatory policies to control the allocation of natural resources and internalize negative environmental externalities. A great deal of attention has also been given to developing methods for more accurately quantifying the costs and benefits of internalizing externalities. We do not mean to contradict this important body of economic work by suggesting that there is a problem when business historians treat the environment as an “externality” in their research. We recognize (as we assume most business historians do) the importance of the externality concept for business history. Under many conditions, industrial pollution and other harmful environmental impacts of business do indeed generate “social costs” that are not reflected in the prices charged or paid. Like imperfect information, public goods, and


monopoly power, environmental externalities have been imperfections in the market system that have prevented ostensibly “rational” economic decisions from leading to efficient outcomes. This often distorted the market, preventing it from optimizing economic welfare in the neoclassical sense. As a result, over the long run, in the absence of effective regulation, even the biggest, most successful firms could not operate efficiently in the welfare optimizing way envisioned by neoclassical economists.

Rather, our complaint is that business historians have tended to treat the environmental dimensions of business development—questions of “natural” goods and supplies as well as pollution and other harms—as if they were externalities to the enterprise of business history itself. We have taken the “externality” of environmental issues for granted, treating them as if they were spillover effects of industrial activity to which we need not pay attention. We have fallen into the trap of assuming that environmental factors and problems were extraneous to the development of business institutions and managerial decision making—even when this was not the case.

The purpose of this special issue is to challenge these assumptions about the externality of the natural environment to business history. Instead of continuing in the current mainstream path, we want to persuade our fellow historians to start asking explicit questions about the role of environmental factors in industrial development and corporate evolution in different places and times. More open-minded and empirical research will allow us to better determine how nature actually figured into what business managers did: how managers did or did not handle their firms’ extraction and transformation of natural resources; how nature’s openings and impositions shaped their strategies and organizational choices; and what impacts their activities had on their human and nonhuman physical surroundings.

Within environmental history, the “tragedy of the commons” model popularized by Garrett Hardin has similarly steered environmental historians away from more penetrating empirical research into the history of the modern firm. Writing near the

height of the post-World War II environmental movement, biologist Hardin drew on William Forster Lloyd’s writings about the enclosure movement in eighteenth-century England for a model of how self-interested extractive activity culminates in environmental devastation. The “tragedy of the commons” posited a community of sheep holders composed entirely of atomized economic actors who were incapable of incorporating the externality effects of their actions into their economic calculations. The private market gave the sheep owners every reason to use the commonly grazed pasture as intensively as possible. It gave them no economic incentive to curb their herd’s grazing so that the pastur-lands would be conserved.

This neoclassical conception, based on experience prior to the modern firm’s emergence, has become “central to environmental studies” and to the analysis of many environmental historians. Even when questioning its universality, however, environmental historians have too quickly assumed its validity for corporate motivations and behavior. They have asked very few questions about how business managers actually managed their firms’ environmental impacts in a given time and place.

In contrast, what we have discovered in our own historical research, and what we see in the articles we have reviewed for this special issue, is that when environmental impacts like pollution do come to be perceived as “problems,” they do not stay “external” to economic actors for long. Instead they stir increasing deliberations and engagements among those concerned, including business managers. The environment is thereby brought within the cultural sphere of those who manage business organizations. It influences their thoughts and actions, whether as managerial decision-makers within the firm or as civic actors beyond it.

Like other members of society, business managers do not line up in a monolithic fashion in opposition to pollution control and other

forms of environmental protection. As one of us, Christine Meisner Rosen, showed in an article in this journal, a group of Chicago businessmen near the turn of the century became involved in anti-smoke campaigns. They took it upon themselves to clean up their own as well as their fellow business owners’ smoke stacks, some of whom strongly opposed their efforts. However “social” or “external” the cost of smoke pollution may have been in theory, many business people saw their own advocacy of smoke reform as pivotal to maintaining their reputation both among their fellows and among actual or potential customers in Chicago and elsewhere. Theirs was an “altruism” with a steady eye to the bottom line.

Moreover, once we move to consider the entire range of business dealings with material throughput and its impacts, it becomes clear that what can seem “external” to business calculations in one era can become a carefully figured entry on corporate balance sheets in another. In his book, Hazards of the Job, Christopher Sellers showed how industrial diseases arising among workers in lead factories and mines remained largely external to the economic calculations as well as the awareness of American owners and managers in the late nineteenth century. Once a hue and cry were raised within and without the factory, however, and especially once an industrial hygiene expertise and a workers’ compensation system began to hold firms accountable for some of these costs, companies started to pay experts to assess and remedy these “problems.”

In sum, rather than writing off business’ environmental relations as “externalities,” we propose that business historians treat the environmental dependencies and impacts of business just as they have treated market conditions and labor relations. We urge our colleagues in business and environmental history alike to investigate the ways in which people in industry have viewed, used, and otherwise managed natural resources and allowed, palliated, or ignored the environmental consequences. Take a look at how managers have responded to the existing possibilities and constraints of the physical world, as well as those posed by markets, economics, technologies, social and governmental demands. Test the hypothesis that managers in specific industries knowingly managed their firms’ environmental impacts in ways that

25 Christine Meisner Rosen, “Businessmen Against Pollution in Late Nineteenth Century Chicago,” Business History Review 71 (Fall 1995): 351-397. See also critiques of the commons model such as those by Bonnie J. McCay (“The Ocean Commons and Community,” Dalhousie Review 74 ([1994-95]: 311-338), Arthur McEvoy, and Louis Warren which call for “a more anthropological approach” (quote from McCay, 316).

26 Christopher Sellers, Hazards of the Job: From Industrial Disease to Environmental Health Science (Chapel Hill, N.C., 1997).
harmed or benefited natural ecosystems or human health. Consider whether firms reduced pollution and mitigated other environmental problems, not only in reaction to court decisions and regulation, but also in order to maximize profits or to enhance the personal goals of individual managers.

For a starting point, we take our cue from the integrative vision of the young Karl Marx: "... the celebrated 'unity of man with nature' has always existed in industry, just like the 'struggle' of man with nature ..."27 As Richard White suggests in his history of the Columbia River, *The Organic Machine*, this unity as well as this struggle are encompassed in the notion of "work" performed on "nature."28 All business activities involve the direct or indirect manipulation of materials and energy derived from the natural world. This involvement can be as glaringly obvious as the clear-cutting of a forest, or as subtle and covert as the nearly invisible electronic sinews grounding global hedge funds and the vast and growing commerce of the Internet. Whatever the level of visibility, an environmental history of business must keep an eye on the "natural" origins of the physical stuff used in economic production. It must trace the environmental metamorphoses and impacts that result, as well as the operative notions of "nature" and the "natural" that guide and constrain such transformations. Seen in this light, questions about the environment are not peripheral but central to business history. They are a basic dimension of what business is about.

Industrial ecologists have laid out a useful framework for conceptualizing this unity between business and nature.29 They have developed a theoretical model of an "industrial ecosystem" that describes the flows of material and energy that connect business with the natural world. Materials and energy flow from the natural world into the industrial system and back out again in a continuous and never ending feedback loop. Stages in these currents divide roughly into three: one, the transformations by

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which natural resources are extracted from the earth and converted into raw materials and mechanical energy; two, the manufacturing operations by which these material and energy flows are worked and reworked into useable or saleable products; and three, those processes and practices by which manufactured products come to be distributed to and used and disposed by consumers.

All three of these stages in the flow of materials and energy between business and the natural world generate “wastes” that can become “pollution.” Though the content and definition of these terms may vary drastically across time and place, our articles show how resource extraction, manufacture, and consumption all eventually give rise to excess or residual materials, from the brine of oil wells and the smoke of industrial boilers to peeling house paint. Treated or untreated, these inevitable discards return directly to the natural world, where they eventually decay or degrade over time—unless managers or consumers shunt them back into the production and consumption loop by reprocessing and reusing them. Our articles show how these wastes could have powerful consequences that managers could not ignore.

Business managers and institutions play an active role in directing the flow of energy, materials, and wastes, through all the stages of production and consumption in the earth’s industrial ecosystem. In so doing, they deeply influence how the rest of society emits waste and interacts with and impacts on the natural world. Most business historians are quite familiar with the effects that mines and factories have had on the air people breathe, the water they drink, and the physical landscape in which they live, work, raise families, and engage in recreational activities, even if these subjects are not often addressed in their historical work. What is important about the industrial ecology concept is that it directs attention to how flows of energy, material, and waste within industry affect the world beyond the factory and office when they move into the realm of the society that consumes the fruits of industrial production. As one of our articles indicates, this outflow could bring toxic chemicals directly into the homes and schools of ordinary Americans. It has also led to animal and plant extinctions and other less drastic forms of natural eco-system change and may be causing global climate change. Industrial ecology points toward management’s role in
fostering the consumption that drives such broad environmental change, as an important facet of the historical relationship between business and the environment.

At the same time, we also need to recognize where, for our purposes, the analytical model distilled by industrial ecologists falls short. A theory developed by engineers, industrial ecology focuses heavily on quantitatively analyzing material and energy flows as they move through industrial ecosystems. It also devotes a great deal of attention to the development of more environmentally benign product designs and manufacturing systems and the creation of waste exchanges and other engineering systems, in an effort to close material and energy flows to bring them more in line with the closed loop flows characteristic of natural biological ecosystems. As yet, however, it offers only the crudest of tools for grappling with the symbolic or strategic dimensions of managerial decisions, especially those dealing with marketing, advertising, public relations, and even philanthropy, which may sustain or alter the flow of commodities past the factory or office door. Nor does it adequately contend with how changing understandings and values may alter decisions about the streaming of energy or material within the workplace as well as without. Not least of its limitations, it gives minimal attention to how market factors shape the managerial thoughts and actions that direct the flow of energy and materials through industrial ecosystems. In contrast, we’ve seen fit to craft an approach to business history that is at once ecological and economic and cultural.

No matter what aspect of business’s co-evolution with the natural world a business historian may choose to tackle, he or she will confront a wide array of questions and challenges. In soliciting and editing the articles for this special issue, we have settled upon several themes and guidelines that we feel are critical to an ecocultural approach to business history.

One of the most important themes is technology. From flaked rocks and other simple hand tools, to water, steam, and electric powered machinery and the modern computer, technology has shaped economic production in a myriad of ways since ancient times. Many of the most important stories waiting to be told in the ecocultural history of business pivot around some technological change, whether in energy sources, shop floor processes, or extractive machinery. As the articles assembled here
show, technology has served as an instrument both by which business managers exploited and/or degraded the environment and as a tool by which they sought to rectify the damage. We must address both sides of this historical potential.

A second theme is the role of the market, a topic as central to an ecocultural business history as it is to the other more conventional aspects of our discipline. The market has shaped business’s interactions with the natural environment in truly powerful ways. It is, as we all know, the primary engine of business’s development and so a major determinant of business’s impact on water, air, land, climate, and biological ecosystems. With all its imperfections (including environmental externalities), it set the prices that determined when and where managers chose invest in the technologies that allowed them to extract raw materials from the earth and process them into manufactured goods. It was the mechanism through which consumers discovered the prices of those goods and purchased them. It provided the signals that enabled managers to decide whether it made economic sense to invest in technologies to abate pollution and other environmental harms.

The market did not operate in a vacuum, however. A third theme with which ecocultural business historians must grapple is the role of the government in shaping the interactions between business and the natural world. We cannot address the role that the marketplace played as a driver, mediator and shaper of the material flows of materials through the industrial ecosystem without studying the role of the state. Through its allocation of property rights, its adjudication of court cases, its regulation of economic activity, its ownership of natural resources, its decisions to go to war, and other activities, government has played a crucial role in structuring the institutions that define the market signals to which business managers responded. It has also imposed rules and requirements on business that sometimes forced managers to take actions that conflicted with or changed those signals. Government figures prominently in all of the articles assembled here, not just as an actual or potential environmental regulator, but as an advisor to industry, the creator of demand for manufactured goods, and a shaper of values and attitudes.

While the ecocultural history of business shares these three themes with other approaches, its distinctiveness resides in the guidelines by which it addresses them. First, the ecocultural perspective in business history consistently focuses on the cul-
tural shaping of the interface between business and the environment. "Culture" here includes the ideas, values, and assumptions of business managers regarding what is good, bad, technically and economically feasible with regard to environmental issues—as well as those of environmentalists, government regulators, judges, scientists and the public as a whole. For instance, to understand the impact of either markets or the state in the history of environmental management, it is necessary that we examine the critical role that managerial (and non-managerial) perceptions of cost and "interest" played in the economics and politics of pollution control. We must not assume that these ideas are necessarily objective measures of reality. Our historical actors may have believed that their ideas accurately reflected economic, political, technological, or ecological reality, but notions about economic and political self-interest have proven at least as mutable as ideas about the workings of nature. Several of our authors offer glimpses of how managerial perceptions of their industry's economic interest in pollution control evolved as market conditions, production and control technologies, scientific knowledge, and the law and regulatory policies developed.

As business historians, it is important that we examine the environmental impacts of culture at the level of the individual firm or industry, at least to the extent the primary sources permit this. We must be sensitive to the fact that individual managers at different companies typically exhibited a range of attitudes toward environmental issues. Management attitudes and practices also varied across different industries. We need to try to understand the reasons for these differences as well analyze their consequences—for the development of business, as well as the evolution of the natural world.

We must also explore the values and experiences of ordinary factory workers. Direct contact with the raw materials and machinery of production often made workers the first witnesses to the environmental consequences of managerial decisions. From their ranks came the earliest victims of industrial materials later decried as environmental toxins, like lead paint and pesticides. Communities of working families have historically born witness to their suffering as well as to the worst environmental disasters wrought by corporations, from Donora to Love Canal to Bhopal. Depending on era and topic, the ecocultural historian of business may find workers' experiences as revealing and impor-
tant as those of the managers who direct their labor, a valuable counterpoint from which to evaluate the significance of the attitudes and values expressed by high ranking executives and other business managers and professionals.

In addition to these micro-level aspects of business culture, however, we must address more macro cultural dimensions of the business-environment interface. Broader societal and national cultural contexts shaped the values and attitudes that managers and workers and others brought to the subject of business’s use and abuse of the natural world. One of the most surprising discoveries we made in the course of putting this special issue together is the powerful role that national cultures played in how business people and government regulators made sense of and dealt with pollution and other environmental problems. Further grappling with this dynamic requires that American business historians pay more attention to work being done by business historians in Europe, Asia, and elsewhere. While one of the most exciting contributions of the Chandlerian business historians has been the world-wide similarities they have documented in the evolution of corporate organization, the ecocultural perspective may better enable us to understand how, over time, differences in national cultures led to different managerial experiences even in similarly organized firms.

Throughout, another fundamental guideline for ecocultural inquiries into business history must be to maintain a steady attentiveness to the physical world with which business people and their enterprises interact. One of our most important tasks is to incorporate analysis of the material world into our study of the evolution of the firm. We need to explore how business managers responded to the opportunities as well as the constraints offered up by their material surroundings. Environmental history has deep roots in historical approaches that attribute agency to influences and forces beyond the social or cultural activities of humanity—to climate, geography, pests, disease vectors and the like. Business historians can profit by following suit. We need recognize the agency of the physical world, even as we attend to the agency of business. This is to say that we need to address both the matter of how business has been shaped by the physical world and the matter of how managers have in their turn managed that interaction. From the vantage point of this dual focus, business historians can provide a unique perspective on one of environmental history’s chief concerns: the dialectical, interactive dance between human and non-human agency in history.
As our authors will testify, culling and interpreting the evidence to write nature into business history poses a variety of methodological difficulties. Society, culture, even markets arise out of the fabric of human talk, evidence of which we can often obtain through documentary records. Alas, however, many of the natural world’s physical actors and influences, from smoke or lead dust to perturbations of climate, register fitfully in the documentary leavings on which historians must rely.

Today’s scientific accounts of environmental agents and dynamics can help us overcome this hurdle, aiding our understanding of the environmental conditions to which past business managers (and government regulators, and ordinary citizens) responded. We can make use of contemporary research bearing upon those aspects of nature about which we plan to write, whether in biology, chemistry, physics, or other natural sciences. Applying modern science to the past presents further dilemmas, however, since the knowledge and awareness in other times and places often proves so different from today’s claims. Fortunately, those more Western and industrialized societies which environmental historians of business will likely study offer at least some precursor body of written knowledge on most environmental dynamics and effects we will choose to investigate. Often it has been compiled by some earlier group of scientific professionals.

We nonetheless think it necessary for ecocultural historians of business to contend with the culturally rooted dimensions of knowledge, rather than relying entirely upon the “truth” of modern science to explain everything. We also need to make sense of the often dramatic differences between past and present claims about the physical world, rather than simply dismissing the old assumptions and understandings as incorrect. Economists’ notions of “information” and “uncertainty,” while they provide some tools for dealing with such questions, can only go so far.30 Taking our cue from the work of anthropologists and cultural studies of science, we urge business historians to piece together how nature and its operations looked to past business people and their experts.31 However mistaken today’s science may ini-

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tially make business people in other times and places appear, ecocultural historians may find that the past natural knowledge or expertise on which their business subjects relied had its own internal sense and coherence. Understanding how different groups socially and culturally constructed nature in the past—what they believed certain rocks were and could become, what harms they thought a metal to cause—will strengthen our explanations of past business behavior. For while business decisions had objective impacts on the physical world that today’s science may better comprehend, managers often made those decisions quite rationally in the context of their convictions about that world. We need to take seriously both past and present knowledge about nature in order more fully to fathom the history of the business/environment interface.

This brief list of desiderata for an ecocultural approach to business history is far from exhaustive. It should nevertheless be enough to give our readers a sense of where we’d like to see the field go, and how to get there. Of course, the greatest challenges come as we pursue more than just a couple of these themes and guidelines and seek to weave them together into coherent and illuminating narratives.

We are pleased to present some excellent articles that we believe have met these challenges. Four pieces can only suggest the plenitude of topics along the interface between environmental and business history, but these cover a great deal of ground. Their emphasis, like most of the papers sent to us, falls on how business managers themselves dealt with the more harmful environmental dimensions of their operations, especially industrial pollution and its control. Each of the four illustrates important aspects of what it means to write business history from an ecocultural perspective.

Hugh Gorman’s article, “Efficiency, Environmental Quality, and Oil Field Brines: The Success and Failure of Pollution Control by Self-Regulation,” concerns the management of oil field brines, a form of water pollution associated with first phase in the flow of materials through the industrial ecosystem, resource extraction. Gorman examines the methods by which petroleum producers disposed of the salt-water wastes generated by the drilling of oil wells between 1920 and 1970. His article provides a clear illustration of the two edged nature of industrial technological innovation. Gorman explains both how the development of technologies for extracting oil form the earth polluted water in
the American Southwest, and how oil companies developed technologies for abating that pollution. He also provides insight into the intertwined way in which government and the market place affected management decision making in the area of industrial pollution abatement. Courts and government regulators pushed the industry to develop methods for controlling brine pollution from the 1920s on. Significantly, however, the more advanced forms of abatement went hand in hand with the more efficient exploitation of oil resources, at least until the 1950s and 1960s when the goal of increasing the efficiency of production began to diverge from the goal of protecting the environment.

Frank Uekoetter's article, "Divergent Responses to Identical Problems: Business and the Smoke Nuisance in Germany and the United States, 1880-1917," deals with questions relating to the pollution generated by the burning of coal as fuel for industrial production and the heating of factories, offices, stores, and homes—a problem associated with the second stage of material flows through industrial eco-system. Uekoetter examines efforts by industry and government regulators in Germany and the U.S. to deal with industrial smoke pollution during the late nineteenth and early twentieth centuries. Uekoetter documents surprising differences between the German and American responses to the coal smoke problem. The differences involved business attitudes toward smoke abatement and regulation as well the methods used by government regulators to impose control on smoke polluters. His essay suggests that distinctive national cultures and political institutions played a critically important role in how business, government, and the broader society construed and defined the problem of pollution and its possible solutions.

The article by David Stradling and Joel Tarr, "Environmental Activism, Locomotive Smoke, and the Corporate Response: The Case of the Pennsylvania Railroad and Chicago Smoke Control," also looks at the problem of controlling industrial smoke pollution in the early twentieth century. In contrast to Uekoetter, Stradling and Tarr examine this subject from the perspective of a single corporation, the Pennsylvania Railroad. By focusing on a single firm, this article shows how Chandlerian institutional history can illuminate the interface between business and the environment. Using materials from the Pennsylvania Railroad's corporate archives, Stradling and Tarr analyze the Pennsylvania's organizational and strategic responses to the efforts of smoke...
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reformers to use regulation to force the firm to reduce its smoke. They explore how management tried to appease regulators through technological retrofitting of their locomotives, fuel substitution, and employee training, documenting its efforts to balance responsiveness to regulation and public protest with cost minimization in the face of fluctuations in the economy as well as public and official interest in the smoke problem. They also describe the methods management used to lobby reformers and city government official to stave off regulations that would have forced the company to take more extreme steps to reduce its smoke by electrifying its facilities.

Christian Warren’s article, “Toxic Purity: The Progressive Era Origins of America’s Lead Paint Poisoning Epidemic,” shifts the focus of analysis back to a more macroscopic level. It concerns the management of toxic materials at both the production and consumption stages of the industrial materials flows process. Warren explains why the U.S. Congress debated but never passed laws to regulate the use of lead in paint during the Progressive Era. This failure had consequences not only for workers in lead paint factories, but also for consumers and for the whole paint industry’s technology of production, product design, and industry structure. It also impacted the consumers of paint. Like Uekoetter’s article, Warren’s sheds light on the role of culture in environmental regulation. In particular, it opens a window on how values and widespread popular assumptions about the “nature” of things influenced business approaches to environmental problems and shaped the outcomes of environmental policy debates. The essay also makes a new contribution to the debate over business power and regulatory failure that so fascinated radical revisionist historians during the 1960’s and 70’s. Warren shows that what sealed the success of the American lead industry and its allies in turning back the legislative ban on lead paint was not so much the lead paint companies’ political power vis a vis the newer non-leaded paint producers, but a common and widely accepted fabric of knowledge, perceptions, and values shared by the entire paint industry as well as many public health reformers.

In sum, the articles in this special issue have a great deal to tell us about how business managers coped with the pollution

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generated by different materials flows, from oil and coal to lead. Managers reacted to a wide variety of influences in determining and then acting upon what was in their interest: to markets; to available technologies; to government policies; as well as to personal as well as more broadly held attitudes about such issues as the nature of product purity, the right of a corporation to operate in profit maximizing ways without interference from regulators, and the obligation of managers to respond in forthcoming ways to the public's objections to environmental degradation.

These essays put to rest any assumption that it is possible to confine business's historical role and place to a traditional focus on the internal organization of the firm. Like the smoke that finds its way outdoors, like the lead that becomes coloring material for wall paint, like the oil brines that seep through the ground, each of these stories draws attention to the connections between what managers do with regard to production, marketing, and other internal business functions and people, events, and material and biological conditions in the world beyond.

At the same time, the articles also make clear that there is a real place for the history of the firm in environmental history. All of our articles trace industry's environmental impacts back to decisions and events inside business: to the management and technology of production, marketing, procurement, and other practices of business people qua business people. Gorman's examination of oil brine disposal leads him into, among other things, analysis of corporate strategies for minimizing the cost and maximizing the efficiency of oil extraction and for managing risks associated with pollution litigation. On questions of industrial air pollution, Uekoetter delves into the technology and efficiency of coal based energy in industry. Stradling and Tarr tackle the energy economics of converting from coal to electric power, as they explore how one railroad's managers responded to public pressures to cut back on smoke. Even Warren, in explaining Congress's early failure to regulate the health hazard of lead in paint, explores conditions in industry. He examines not only the political power and lobbying activities of the leaders of the lead paint industry, but also the organization of the paint industry and the technology of making lead paint. He finds that managers' ideas about the lead hazard, based on their experience with factory workers, blinded them to the health risks lead paint posed to people outside the factory.
All of our authors effectively integrate histories of business’s environmental relations with the mainstream concerns of business historians. They also seriously contend with many under-examined cultural dimensions of business practice. Taken together, these four articles illustrate the range and value of an ecocultural perspective for business historians. We believe such a perspective can both encompass and deepen some of the most provocative recent visions for a new business history. Its distinctively historicist materialism can serve as a basis for weaving business together with its material and symbolic environments in a seamless web. Not only can this new approach help us bring the complex physical, cultural, managerial, technological, and economic connections between business and the environment into better focus; it also gives us another route through which we can explore the relationships between business and nationality, business and politics, and business and public policy.