

RICHARD MAXWELL AND TOBY MILLER

Film and the Environment

Risk Offscreen

When you think of film and the environment, does your mind turn to how cinema has depicted nature and pollution?¹ Do you revel in Adorno's conceit that cinema can provide an "objectifying recreation" akin to dreaming about landscapes, as if that would prettify urban existence?² Isn't "representation" what turns film academics on? Or perhaps your mind turns to how filmmakers use their celebrity status to draw public attention to related causes. Hollywood stars love to add "carbon footprints" to their lists of enviable personal traits. Small is finally fabulous, and the ecorazzi (paparazzi on the eco-celebrity beat) oblige with nonstop, if sometimes rather arch, coverage, especially since the advent of the Environmental Media Association's awards and the 2007 "Hollywood Goes Green" summit meeting.³ For example, *Hollywood Today* boasts that actors give green gifts of "vintage-inspired" camisoles and recycled jewels, but MSNBC.com admonishes that although "the Prius reigns supreme as the current status symbol" in Hollywood, "trucks that carry equipment from studios to locations and back continue to emit exhaust from diesel engines," as do generators on set.⁴

The MSNBC story suggests that a scholarly focus on just representation or celebrity isn't, pardon the trope, sustainable. A study of Hollywood's environmental impact has disclosed massive use of electricity and petroleum and the release of hundreds of thousands of tons of deadly emissions each year. In fact, the motion picture industry is *the biggest producer of conventional pollutants* in the Los Angeles area. Municipal and statewide levels of film-related energy consumption and greenhouse-gas emissions (carbon dioxide, methane, and nitrous oxide) are about the same as the aerospace

and semiconductor industries.⁵ Film consumers are also major producers of pollutants, from auto emissions en route to the theater and chemical runoff when parked there to the energy powering home-entertainment devices.⁶

What would happen to the discourse on film if, rather than yet more textual analysis or promotional dross, it confronted the fact that, for example, millions of cartridges of Atari's failed electronic game adaptation of *E.T.: The Extra-terrestrial* (dir. Steven Spielberg, 1981) were buried in a New Mexico landfill, broken up by a heavy roller, and covered in concrete to consign them to history?⁷ What would it mean if those involved in cinema studies and journalism were required—as an ordinary part of their work—to evaluate motion picture production ecologically?⁸ What would they make, for example, of *The Beach* (dir. Danny Boyle, 2000), in which (textually) a modern-day Eden suddenly turns nasty for jaded tourists?

Thai environmental and pro-democracy activists publicized the arrogant despoliation they experienced when Fox was making *The Beach* in Maya Bay, part of Phi Phi Islands National Park. Natural scenery was bulldozed because it did not fit the company's fantasy of a tropical idyll: sand dunes were relocated, flora rearranged, and a "new" strip of coconut palms planted. The producers paid off the government with a donation to the Royal Forestry Department and campaigned with the Tourism Authority of Thailand to twin the film as a promotion for the country. Meanwhile, the next monsoon saw the damaged sand dunes of the region collapse, its natural defenses against erosion destroyed by Hollywood bulldozers. All the while, director Boyle claimed the film was "raising environmental consciousness" among a local population that was allegedly "behind" U.S. levels of "awareness."⁹ And those levels would be? Hadn't Boyle learned from Fox's earlier confrontation with the people of Popotla, in Baja California, whose village was cut off from the sea and local fisheries by a walled "movie maquiladora" built to keep them away from the production of *Titanic* (dir. James Cameron 1997)? After Fox's chlorination of surrounding seawater "destroyed a crop of sea urchins that Popotla had fished for decades" and reduced overall fish levels by one-third, the Popotlanos demonstrated *their* "environmental consciousness" by decorating the wall with rubbish to ridicule the filmmakers and call for *mariscos libre* (freedom for shellfish).¹⁰

The wider background to this ecologically destructive filmmaking was the message of economic structural adjustment peddled by the World Bank, the International Monetary Fund, the World Trade Organization, and the sovereign states that dominate them. This neoliberal clerisy had encouraged a turn away from subsistence agriculture and toward tradable goods, beyond manufacturing capacity and in the direction of service exchange.

In much of Southeast Asia, structural adjustment pushed people to littoral regions in search of work, and fish-farming corporations created a new aquaculture, displacing the natural environment of mangroves and coral reefs that protect people and land. And the requirement for the third world to constitute itself as a diverting heritage site and decadent playground for the West has seen Thailand, Indonesia, and Malaysia undertake massive construction projects of resorts located at the point where high tides lap, attracting more and more workers and decimating more and more natural protection (areas that had not been directed to remove natural barriers suffered dramatically fewer casualties in the 2004 tsunami).¹¹

Such questions barely appear on cinema studies' agenda, even when the discipline examines the film industry via political economy and policy approaches.¹² Nor are they part of popular film criticism or publicly available fan discourse. In this chapter, we seek to address these largely neglected matters, arguing that an environmental perspective is crucial to understanding film commerce, culture, and politics throughout history. We begin by establishing our theoretical coordinates, focusing on Ulrich Beck's concept of "risk society" (*Risikogesellschaft*) and the science studies work of Bruno Latour. Then Hollywood comes into view.

RISK (AND THE UNITED STATES)

According to Beck, democratic industrialized societies are characterized by "institutions of monitoring and protection" that aim to bring order to a chaotic world. A risk society "organises what cannot be organised" by creating institutions to protect people from "social, political, economic and individual risks." If early modernity was about producing and distributing goods in a struggle for the most effective and efficient forms of industrialization, with devil-take-the-hindmost and no thought for the environment, risk society is about enumerating and managing those dangers via probabilistic, or scenario, thinking that imagines a range of possible outcomes. Rather than being occasional, risk is now part of what it means to be modern. This second modernity is characterized by ever-more sophisticated mechanisms for measuring risk, even as the range and impact of risks grow less controllable with the proliferation of technologies and markets that "improve" life while adding unforeseen harm.¹³ We can see instances of this in capitalism's imposition of time discipline over working-class life, which improved the productivity of industrial labor but posed new potential and actual risks to workers' minds, bodies, and communities. The increasing velocity of production, with an unprecedented variety and volume of commodities, fostered a new fetishism and engendered the modern detachment

from the natural environment. Risks posed by an unruly nature and proletariat were disciplined in the service of growth and progress.

Risk society also resides in the public-safety surveillance operations that regulate modern life: electronic monitoring of traffic at intersections for safer crossing of pedestrians and vehicles in densely populated cities; air-traffic control; credentialing trained drivers, pilots, or food and drug makers; centralized monitoring of private economic activity, such as banking, tax payments; and so on. It embodies and propels the desires of capital and state to make sense of and respond to problems, whether of their own making or not. As governmental and commercial knowledge aggregates statistics to define, measure, and model populations in the interest of social control and productivity in advanced industrial/postindustrial societies, it also induces massively increased feelings of risk in people. Risk societies admit and even promote the irrationality of the economy—as a means, paradoxically, of governing populations—by naturalizing despoliation, global labor competition, cyclical recession, declining life-long employment, massive international migration, overreaching communications technologies, and the rolling back of welfare-state protections.

We have seen this combined with a “cultural logic of computation” that makes inequality and income redistribution toward the wealthy axiomatic.¹⁴ Denizens of postindustrial societies are factoring costs and benefits into everyday life as never before, while their sense of being able to determine the future through choice is diminished. Ironically, the future orientation of the risk society lacks the revolutionary sensibility of forward-thinking politics. Risk thinking has weakened ideological commitments to Marxism, feminism, and anti-imperialism. Unlike the notion of a broad Left that once infused such struggles, political and social issues are delinked from a central organizing critique, such that a position adopted on ecologically sound consumption says nothing about a position on popular democracy. The taming of chance worsens the odds for radical change.¹⁵

The United States is *the* risk society, with 50 percent of the population participating in stock market investments. Risk is brought into the home as an everyday ritual, an almost blind faith (sometimes disappointed) in mutual funds patrolling retirement income. The insurance costs alone of September 11, 2001 have been calculated at \$21 billion. In 2005, U.S. residents spent \$1.1 trillion on insurance—more than they paid for food, and more than one-third of the world’s total insurance expenditure. The industry’s global revenues exceed the gross domestic product of all countries bar the top three. At one level, this represents a careful calculation of risk, its incorporation into lifelong and posthumous planning—prudence as a way of life. At another, it is a wager on hopelessness and fear. As dangers mount,

safeguards diminish, and statisticians become the new mavens of risk management within corporate and government sectors.¹⁶ So whether we are discussing nuclear power plants or genetically modified foods, the captains of the respective industries argue that they pose no risks, but insurance companies decline to write policies on them for citizens—because they are risky. Much of this relates to the deregulatory intellectual and policy fashions of the last three decades, which have aided the historic redistribution of income upward by opposing the universalization of Medicare, reducing labor protection, and ideologizing against collective action other than in the private sphere—at the same time as people confront spiraling health costs and multiplying economic changes.¹⁷

So where do motion pictures take their place in risk society?

RISK AND HOLLYWOOD

Historically, risk in Hollywood has meant financial risk. From the first time a script was used, movie making entered into the risk-reduction business. Financiers could get a foretaste of what they were paying for; shots could be ordered, schedules made, and shooting days organized; budgets could be tamed by the elements on the page—the number of actors, elephants, street scenes, bathing beauties, makeup people, electricians, camera operators, and sets all entered into a ledger. Risk diminished with the establishment of movie theaters, which made film viewing less haphazard, film demand more predictable, and film distribution less chaotic. Financial risk could also be reduced by establishing market dominance. Examples include Edison Company and Biograph using patent protections to fight foreign film's dominance of U.S. screens in the early 1900s, until antitrust laws caught up with them; studios simultaneously owning movie theaters to guarantee with near certainty audiences, until regulators said this was illegal in the 1940s; Hollywood's distribution cartels reducing the risk of foreign competitors' success, to retain some certainty in overseas dominance; and film-stock monopolies creating better odds of controlling demand but also of defining what passed as proper skin tone.¹⁸

The surveillance of film audiences may be the most influential, if reviled, method of risk reduction in the motion picture industry, growing in status from the earliest days when exhibitors began to ask for feedback to the current wizardry associated with a billion-dollar market research business.¹⁹ "Demand uncertainty" remains the driving force behind the ongoing investment in market research.²⁰ Until now, such uncertainty, alongside perpetual risk of financial failure, has defined Hollywood's place in risk society. The humanities' latest fetish, "creative industries," institutionalizes

this kind of service to business, in keeping with its dedication to neoliberal discourse.²¹ One of us well remembers being invited to a conference on film economics at a large university in the Midwest where the papers were all about risk and how to reduce it in terms of producers' financial investments. To speak of the public good, or workers' interests, or anything else, was to be outside the discourse, outside the conference, and in the wilds of St. Louis. It was to be beyond risk and film.

However, in recent years a new specter of risk has provoked a subtle but significant shift in Hollywood's business strategy. As we'll show, Hollywood is profoundly complicit in the world's ecological crisis. To counter that risk, we must see it as an *environmental participant*, not merely a signifying agent of information and pleasure. Movies are not just things to be read; they are not just coefficients of political and economic power; and they are not just industrial objects. Rather, they are all these things—hybrid monsters, coevally subject to rhetoric, status, and technology, to text, power, and science: all at once, but in contingent ways.²²

Since the 1960s, environmental risks have slowly become central public and academic concerns, with the rise of environmental science and public policies protecting air, water, and soil. The United States has seen a doubling in membership of environmental groups between 1980 and 2000, with numbers rivaling membership in political parties.²³

Meanwhile, calls for interdisciplinary efforts to confront the eco-crisis have grown within the academy as more and more disciplines have acknowledged their failure to undertake relevant work.²⁴ In this essay we latch onto the momentum of environmentalism to offer a new, greener direction for cinema studies by identifying some key environmental risks associated with filmmaking and consumption. We acknowledge the difficulty of expanding cinema studies to encompass environmental issues, in particular as these emerge from an analysis of political/economic arrangements that have until recently stifled efforts to build green strategies into Hollywood production.

Moreover, it is hard to break away from the dominant discourse of cinema studies, which theorizes the history of film through a predictable set of idealist moves: a drive toward artistic realism; the desire for pleasurable spectacle; a passion for profits; the genius of systems; and the talent of inventors. For example, André Bazin, the twentieth century's most influential film theorist and journalist-critic, tells us that film derived from the imagination, which attained its physical realization in subsequent technological developments. Cinema was "an idealistic phenomenon," with economic and social relations following the lead of a desire for realism. Artists' and audiences' desires drove technological innovation.²⁵

We want to complicate this story by digging a little deeper into economic and political connections between motion picture technologies, the environment, and film form. For example, the development of film stock privileged certain skin tones over others (that would be white over black) via the selection of specific chemical dye couplers, such that a particular kind of whiteness was reproduced much more easily with most industrial and domestic filmmaking technology than darker-toned skin. All this was the outcome of aesthetic, chemical, commercial, and racist choices—not a merry march to realism. And why did 3-D film emerge and then collapse? Not because people liked the concept but not the reality. Its appearance and demise were about Polaroid challenging Eastman's hegemony over film stock and being defeated because exhibitors were unwilling to incur the costs of refitting theaters.²⁶ Similarly, the technical capacity to bring sound to moving pictures existed long before it occurred. War and its associated technologies and bureaucracies stimulated research into the possibilities, but then the power of the telephone corporations after World War I saw sound technologies focused on interpersonal speech rather than visual recordings.²⁷ Yet Bazin's idealist rhetoric remains at the center of cinema studies. There has been little room for what you are about to read, as we illustrate how film's history is closely linked to a widespread pattern of the culture industries as magisterial polluters.

The type and volume of chemical waste emitted into the air and waterways by large-scale raw film production can be traced to the chemical process for extracting cellulose from cotton and wood pulp that was invented in the 1800s. Guncotton, or cellulose nitrate, was the first synthetic commercial plastic and the first celluloid base, upon which an emulsion of light-sensitive silver crystals was applied to make film for photography and motion pictures. Cellulose nitrate was originally marketed as imitation ivory for making billiard balls, combs, and sundry personal items. But raw film manufacturing became the defining application for cellulose nitrate. The equally raw early twentieth-century film industry developed techniques for mass production, financed the techno-scientific research to improve its quality, and set standards for the development of plastics.²⁸

Cellulose nitrate was closely linked to explosives through nitrogen-based chemistry, and film stock was famously combustible. Many precautions were put in place from the earliest days of its production, transportation, and exhibition, including the fireproof enclosure of projection rooms and projectionists trained in handling flammable materials. This film base would eventually be replaced by triacetate and polyester. A substitute of cellulose acetate, a less flammable product known as safety film, was available in the 1920s and prescribed for screenings in "homes, schools,

churches, factories, lecture and assembly halls” and lightweight 16 mm filmmaking.²⁹

The chemical-mechanical process for manufacturing cellulose nitrate film required large volumes of clean water and a variety of chemicals, including alcohol, sodium hydroxide (lye or caustic soda), camphor, and nitric and sulfuric acids. By 1926, Eastman Kodak’s raw film plant at Kodak Park in Rochester, New York, was churning out two hundred thousand miles of film annually, sucking more than 12 million gallons of water daily from Lake Ontario and spewing the used water, along with chemical effluents, into the Genesee River.³⁰ At the end of the century, when it supplied 80 percent of the world’s film stock, Kodak Park was using 35 to 53 million gallons of fresh water a day. By then, Eastman Kodak had become the primary source of pathogens (mainly dioxin, a carcinogen) released into New York State’s environment. Rochester had been “ranked number one in the US for overall releases of carcinogenic chemicals” for the preceding thirteen years—this despite the fact that most of the wastewater was collected in a treatment plant built in the 1970s to comply with the Clean Water Act.³¹

The main ingredients of cellulose nitrate film manufactured after 1890 were cotton and silver. Cotton supplies were abundant in the United States, rising very rapidly in the early decades of the twentieth century.³² Eastman Kodak consumed 5 million pounds of cotton annually in 1926, and almost twice that amount in 1936.³³ While most commercial manufacturers of cellulose nitrate used cotton-mill waste, it is not clear whether Eastman Kodak used mill waste or a mix of available supplies.³⁴ To remove impurities, the cotton was bleached with sodium hydroxide (the same stuff used in wood-pulp bleaching). The treated cotton was then submitted to the nitrating process. It was immersed in nitric and sulfuric acids as it rotated in large perforated vats that allowed the acids to be drawn off. After this acid wash, the nitrated cotton was put into large centrifugal washers that rinsed the remaining acids with large quantities of water, a process repeated over weeks. Once the water was spun off, the cotton was fed into mixers that added a solvent of camphor and alcohol to produce a paste with the viscosity of honey. The camphor was used as a softener or plasticizer that kept the film from becoming brittle. With the substitute of acetic acid and other chemicals, cellulose acetate film was made in a similar way.

The silver arrived at Kodak Park in forty-two-pound bars of bullion, and the company was already processing three tons of silver a week at the turn of the twentieth century, and five tons by 1936.³⁵ The silver bars were dissolved in nitric acid to obtain pure crystals of silver nitrate, which were mixed into an emulsion with potassium iodide, potassium bromide, and gelatin (the latter made from cattle bones and hides). The emulsion was

then applied to the film base.³⁶ By 1926, Eastman Kodak had become the second-largest consumer of pure silver bullion, after the U.S. government mint, and remained one of the largest purchasers of silver in the world even after 2000, when it began to focus on digital photography.³⁷

Working conditions in Kodak Park exposed employees to acids and acid vapors as well as other irritants. The waste from this process also sent bleaches, traces of silver, and acids into the Genesee. Silver is not considered dangerous to humans, although high levels of it are toxic to fish and other aquatic life, but workers at the Eastman Kodak plant were exposed to abnormal levels of silver dust or fumes, which can irritate the upper respiratory tract and eyes.³⁸ Workers exposed to cotton dust also risked daily irritation of their respiratory systems, and if exposed constantly to high levels, they may have contracted byssinosis, or “brown lung,” which could reduce lung capacity. Byssinosis was recognized as an occupational hazard in Britain by the 1940s, but not in the United States until the 1970s, largely because cotton-mill owners had moved operations to nonunionized southern states, where worker protections were weak.³⁹ Workplace hazards and toxic by-product waste were common at Eastman’s chemical plant in Tennessee, set up after World War I to produce solvents, cellulose acetate, and plastics.⁴⁰

The competition effect of capitalism—the tendency toward monopolization—propelled environmental exploitation and despoliation in the raw film business as much if not more than rising commercial demand for film stock. For example, George Eastman was very keen to maintain his monopoly in raw film supply. He worried that German and French competitors might capture part of the market with improved film stock, in particular nonflammable cellulose acetate film, which French Pathé and the German firms AGFA, Bayer, and BASF were developing between 1904 and 1909. So Eastman infringed patent rights to acetate film held by his European rivals. Rather than settle for a cartel arrangement offered by the German companies, he leveraged his contracts and credit deals with European customers to obstruct sales of German film stock, especially from AGFA, which he saw as his main competitor (AGFA expanded during World War I, and survived to reestablish its business with European customers).⁴¹

Eastman experienced less competition for his control over the supply of silver, which was solidly in the hands of U.S. and British interests. In the interwar years, Mexico, the United States, Canada, and Peru were the largest producers of silver ore, and the United States controlled 73 percent of refinery production (including ownership of Mexican refineries by the Guggenheim Exploration Company). China and India were large consumers. China was on the silver standard, which made it vulnerable to U.S.

silver interests. The latter eventually won a favorable purchasing and subsidy agreement from the Roosevelt government in 1933, forcing China into political crisis.⁴²

Camphor was another story. By 1932, 80 percent of its world supply went into film and celluloid products. At that time, virtually all camphor came from Formosa (Taiwan), which Japan colonized between 1895 and 1945. Japan set up a government monopoly for the camphor industry, fixing prices to maintain its dominance of the market against growing competition from synthetic camphor producers. Natural camphor would eventually be replaced by synthetic camphor, derived from turpentine in a process developed in Germany.⁴³ By the end of the twentieth century, Taiwan had become home to Formosa Plastics, the world's largest producer of the plastic polyvinyl chloride.⁴⁴

By the start of twenty-first century, Kodak, the largest supplier of film stock in the world, was dumping "methylene chloride concentrations as high as 3,600,000 parts per billion" into New York groundwater. That was 720,000 times the permissible levels of this pulmonary and skin irritant that humans metabolize into carbon monoxide. The company halved this by 2003 as a result of pressure from regulators and its own desire to reduce celluloid film production and expand its digital media business. Three years later, the ties of film and print came full circle when Kodak announced a process for high-speed digital printing that could be customized by publishers. This new process includes one of the first commercial applications of nanotechnology in the media sector. *Business Week* called it "as important an evolution in printmaking as movable type."⁴⁵

Today's silver halide film stock is under threat by the imminent move to digital printing/filmmaking ("imaging" in marketing lingo). Film will be around as long as millionaire aesthetes and movie moguls insist on its superiority,⁴⁶ but digital production is fast becoming the new standard. It brings with it a new ecological context for filmmaking and film studies. The question is whether the ecological conditions of the digital transition provide a way for motion pictures to become less ecologically destructive.

We have heard the prophecies of digitalism before. Since the early 1970s, the information-based technologies of the "new" economy have been pitched as clean businesses, promising endless gains in productivity, competitive markets, and a brand-new green day for workers, consumers, and residents, where the by-products are code, not smoke. Is the digital transition to green film production just another one of these empty corporate promises?

We are already seeing a range of unforeseen environmental risks flowing from some very basic technical problems associated with digital media

production, distribution, and storage. The root of the problem resides in the computer/electronics industry's familiar business strategy of planned obsolescence, which designs a short lifespan into computer systems (drives, interfaces, operating systems, and so on) along with questionable integrity of the physical media (for example, glitches in recording systems). This has fostered high levels of electronic garbage and energy use, with related waste, pollution, and dangerous working conditions.⁴⁷ Making semiconductors requires hazardous chemicals, including some known carcinogens. The accumulation of electronic hardware throughout the world has caused grave environmental and health concerns that stem from the chemical and material composition of these commodities and their potential seepage into landfills, water sources, and the bodies of workers. Electronic waste (e-waste) is the fastest-growing part of municipal cleanups around the first world. E-waste salvage yards have generated serious concerns regarding worker health and safety wherever plastics and wires are burned and circuit boards leached with acid or grilled, then dumped in streams, to minimize the volume of waste and retrieve valuable items. There are serious implications for local and downstream land and water as well as for residents. Much of the recycling work is done in the third world by preteen Chinese, African, and Indian girls, picking away without protection of any kind at discarded first world televisions and computers in order to find precious metals, then dump the remains in landfills. The metals are sold to recyclers, who do not use landfills or labor in the first world because of environmental and industrial legislation against the destruction to soil, water, and workers that is caused by the dozens of poisonous chemicals and gases in these dangerous machines.⁴⁸

RESPONSES

There are signs of hope. Back in 2004, the Political Economy Research Institute listed media owners at numbers 1, 3, 16, 22, and 39 on their *Misfortune 100: Top Corporate Air Polluters in the United States*.⁴⁹ These firms are clearly feeling the pressure. Today, nearly every major film company has some program of corporate responsibility aimed at saving money and the planet simultaneously.

Fox, the studio that made *The Beach*, is vigorously reexamining its disastrous environmental record, thanks to an unlikely source of progressive thought—Rupert Murdoch. In 2007, he convened a meeting of all News Corporation employees across the world. The sole agenda item was his goal of making the company carbon-neutral by 2010, despite its annual usage of almost 650,000 tons of such fuels. Murdoch told his employees that “[i]f we are to connect with our audiences on this issue, we must first get our own

house in order,” and “[c]limate change poses clear, catastrophic threats.”⁵⁰ Even Fox’s far-right-wing vigilante television show *24* got involved. It became the first carbon-neutral U.S. TV drama in 2009, with offsets calculated against the impact of car chases, air travel, and use of coal-generated electricity, and use of wind and solar power from India where feasible.⁵¹

For its part, Time Warner’s 2008 *Corporate Social Responsibility Report* proclaimed “Energy Efficiency at the Studio Lot since 2002,” announcing that it had saved “over 8 million kilowatt-hours of energy and approximately \$1 million annually” via efficient lighting, heating, and air-conditioning; occupancy sensors and timers; and so on. The corporation even undertook a carbon-footprint analysis in 2007 to determine the greenhouse-gas impacts of DVD manufacture and distribution.⁵²

Other major studios have initiated programs that include installing low-energy light-emitting diodes to illuminate buildings, studios, and outdoor signage; reducing paper use; composting organic waste; retrofitting buildings with computer-controlled air and heating systems and environmentally friendly materials; paying for reforestation out of production budgets to mitigate a film’s overall pollution; teleconferencing; recycling wood, paper, recording media, metals, film stock, electronics, and printer and toner cartridges; managing chemical use and disposal; reducing or eliminating hazardous materials; eliminating and recycling wastewater; installing solar and other renewable energy sources; and networking with green suppliers and organizations like the Greencode Project (funded by the National Film Board of Canada) and the Producers Guild of America’s greenproduction-guide.com, a database of environmentally friendly products and services from vendors across the United States.⁵³

Various governmental and professional trades initiatives support such activities. For instance, the UK Film Council created an “Environmental Strategy” to help “trade bodies and individual companies” reduce the environmental impact of the U.K. film industry, where so many nominally Hollywood products are made.⁵⁴ It remains to be seen whether such policy innovations will continue, given the British government’s decision to shutter the council, announced in mid-2010. And the Science and Technology Council of the U.S. Academy of Motion Picture Arts and Sciences is pressing for industrywide models to deal with aspects of the digital transition that could alter Hollywood’s relation to the environment in positive ways. Though their recommendations do not explicitly mention the environment, they are indirectly linked to environmental risks posed by Hollywood. They reject the current “store and ignore” and “save everything” attitudes of producers and studio managers and plan to reduce wasteful

practices through better-organized responses to technical obsolescence (for instance, standardization and nonproprietary technical collaborations using open-source systems that would help extend the utility of digital platforms).⁵⁵

So there is some good news at the frontier of moviemaking, as risks to the environment are factored into spreadsheets and location shoots, eliminating Styrofoam cups and generating headlines. Now we just need the academic study of cinema to awake from its seemingly risk-free slumber and contribute to the debate! It is essential that manufacturers, regulators, and scholars establish a broader dialogue about e-waste by advancing regulatory options and spurring debate in the midst of new policy-making initiatives. Drawing on Beck's risk analysis, film scholars can relink progressive issues that have been decoupled through the beguiling magic of neoliberalism; and, borrowing from Latour's insistence on multivariate analysis, they can transcend their idealist methods. They will not be alone—much of this work is under way by members of the Environmental Communication Network (www.esf.edu/ecn/), for instance.

And it's worth the effort to rethink the discipline. Since we began talking about these issues in 2003, we've been stunned by the response. We've seen our op-eds in Latin American newspapers reprinted; school pupils rush forward after our talks; graybeards undertake to revise their curricula; and indigenous folks get caught up in a critical enthusiasm. None of this appears to have compromised their (or our) enjoyment of cinema.

Scholars outside film are doing marvelous work on the core areas we should make our own, such as star studies of environmentalism and the impact of documentaries and feature films on audience awareness and understanding of climate change, while the research we have drawn on to reconsider film history virtually all comes from beyond the field and by scholars whose work is rarely or never cited by it.⁵⁶

So each time we write about a film, let's be alert to the environmental burden of production practices, attitudes, and technologies—mise-en-scène has a carbon footprint. Let's endorse celebrity environmentalism for what it is, but move beyond the snide swipes at it from the likes of MSNBC—which ought to know better because General Electric, which owns it, holds the record for carcinogenic polychlorinated biphenyls dumped into U.S. waterways. Let's become more engaged with critical work on technology and the environment as a vital area of film studies and its future—let our debates about analog versus digital aesthetics also speak of phthalates (a poisonous plastic softener), dioxin, and biodiversity.⁵⁷ Each time we support state assistance to the cinema, let's ask that such a policy also guarantee

ecologically sound production practices and working conditions. And each time we go to a movie or watch one at home, let's remember that our impact as spectators spills over into our air, water, and soil. To do otherwise would be . . . unsustainable.

NOTES

With thanks to Bob Stam for stimulating Toby's interest in film and technology, to Bill Grantham and Virginia Keeny for advice on legal citation, and to the editor for her helpful remarks.

1. Jhan Hochman, *Green Cultural Studies: Nature in Film, Novel, and Theory* (Moscow: University of Idaho Press, 1998); Gregg Mitman, *Reel Nature: America's Romance with Wildlife on Film* (Cambridge, MA: Harvard University Press, 1999); David Ingram, *Green Screen: Environmentalism and Hollywood Cinema* (Exeter: University of Exeter Press, 2000); Pat Brereton, *Hollywood Utopia: Ecology in Contemporary American Cinema* (Bristol: Intellect, 2005); Sean Cubitt, *EcoMedia* (Amsterdam/New York: Rodopi, 2005); Deborah A. Carmichael, *The Landscape of Hollywood Westerns: Ecocriticism in an American Film Genre* (Salt Lake City: University of Utah Press, 2006); Cynthia Chris, *Watching Wildlife* (Minneapolis: University of Minnesota Press, 2006).

2. Theodor W. Adorno, "Transparencies on Film," trans. Thomas Y. Levin, *New German Critique* 24–25 (1981–82): 201.

3. Dan Brockington, "Powerful Environmentalisms: Conservation, Celebrity and Capitalism," *Media, Culture and Society* 30, no. 4 (2008): 551–68; Alessandra Stanley, "Sounding the Global-Warming Alarm without Upsetting the Fans," *New York Times*, July 9, 2007, E1; Bryan Walsh, "Living with Ed—in a Green Hollywood," *Time*, November 30, 2007, time.com/time/health/article/0,8599,1689569,00.html; Charles J. Corbett and Richard P. Turco, *Sustainability in the Motion Picture Industry* (Los Angeles: University of California, Institute of the Environment, 2006), personal.anderson.ucla.edu/charles.corbett/papers/mpis_report.pdf, 5; visit ecorazzi.com for "The Latest In Green Gossip."

4. Gabrielle Pantera, "Hollywood Goes Green," *Hollywoodtoday.net*, May 6, 2009, hollywoodtoday.net/2009/05/06/hollywood-goes-green; Michael Ventre, "It's Not Easy Being Green, Hollywood Discovers," *MSNBC.com*, April 23, 2008, msnbc.msn.com/id/24256817/ns/business-going_green.

5. Corbett and Turco, *Sustainability*, 11–14.

6. Kurt W. Roth and Kurtis McKenny, *Energy Consumption by Consumer Electronics in U.S. Residences* (Arlington, VA: Consumer Electronics Association, 2007); Stacey Mitchell, *Big-Box Swindle: The True Cost of Mega-Retailers and the Fight for America's Independent Business* (Boston: Beacon, 2007), 117–19.

7. Pete Engardio with Kerry Cappell, John Carey, and Kenji Hall, "Beyond the Green Corporation," *Business Week*, January 29, 2007, 50–64.

8. Corbett and Turco, *Sustainability*, illustrate the complexity of such research and provide examples of greenish production practices in Hollywood film production.

9. Toby Miller, Nitin Govil, John McMurria, Richard Maxwell, and Ting Wang, *Global Hollywood 2* (London: British Film Institute, 2005); also see Rodanthi Tzanelli, "Reel Western Fantasies: Portrait of a Tourist Imagination in *The Beach* (2000)," *Mobilities* 1, no. 1 (2006): 121–42; Lisa Law, Tim Bunnell, and Chin-Ee Ong, "The Beach, the Gaze and Film Tourism," *Tourist Studies* 7, no. 2 (2007): 141–64.

10. "Popotla vs. *Titanic*," rtmark.com/popotla.html; Miller et al., *Global Hollywood 2*, 165; for photos see rtmark.com/popotlaimages.html.

11. Praful Bidwai, "Prevent, Prepare and Protect," Rediff.com, January 4, 2005, in.rediff.com/news/2005/jan/04bidwai.htm; Devinder Sharma, "Tsunamis, manglares y economía de mercado," trans. Felisa Sastre, Rebelión.org, January 14, 2005, rebelion.org/noticia.php?id=10010; Vandana Shiva, "Lecciones del tsunami para quienes menosprecian a la madre tierra," Rebelión.org, January 15, 2005, rebelion.org/noticia.php?id=10045.

12. But see, within film studies, Robin L. Murray and Joseph K. Heumann, *Ecology and Popular Film: Cinema on the Edge* (Albany: State University of New York Press, 2009); Nadia Bozak, "The Disposable Camera: Image, Energy, Environment" (PhD diss., University of Toronto, 2008); and the physiocratic critique of Harri Kilpi, "Green Frames: Exploring Cinema Ecocritically," *WiderScreen* 3, no. 7 (2007).

13. Ulrich Beck, Anthony Giddens, and Scott Lash, *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order* (Stanford: Stanford University Press, 1994), 5; Ulrich Beck, *World Risk Society* (Cambridge: Polity, 1999), 135.

14. David Golumbia, *The Cultural Logic of Computation* (Cambridge, MA: Harvard University Press, 2009).

15. Ian Hacking, *The Taming of Chance* (Cambridge: Cambridge University Press, 1990).

16. Steve Lohr, "For Today's Graduate, Just One Word: Statistics," *New York Times*, August 6, 2009, A1.

17. Toby Miller, *Makeover Nation: The United States of Reinvention* (Columbus: Ohio State University Press, 2008).

18. Bill Grantham, "Some Big Bourgeois Brothel": *Contexts for France's Culture Wars with Hollywood* (Luton: University of Luton Press, 2000), 44; Candace Jones, "Co-evolution of Entrepreneurial Careers, Institutional Rules and Competitive Dynamics in American Film," *Organization Studies* 22, no. 6 (2001): 911–44.

19. Miller et al., *Global Hollywood 2*, chapter 5; Gerben Bakker, "Building Knowledge about the Consumer: The Emergence of Market Research in the Motion Picture Industry," *Business History* 45, no. 1 (2003): 101–27.

20. Barry R. Litman and Hoekyun Ahn, "Predicting Financial Success of Motion Pictures: The Early '90s Experience," in *The Motion Picture Mega-Industry*, ed. Barry R. Litman (Boston: Allyn & Bacon, 1998), 172–97.
21. Anna M. Dempster, "An Operational Risk Framework for the Performing Arts and Creative Industries," *Creative Industries Journal* 1, no. 2 (2009): 151–70.
22. Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993).
23. Russell J. Dalton, "The Greening of the Globe? Crossnational Levels of Environmental Group Membership," *Environmental Politics* 14, no. 4 (2005): 441–59.
24. Deborah B. Rose and Libby Robin, "The Ecological Humanities in Action: An Invitation," *Australian Humanities Review* 31–32 (2004), lib.latrobe.edu.au/AHRarchive/issue-April-2004/rose.html; American Psychological Association, *Psychology and Global Climate Change: Addressing a Multi-faceted Phenomenon and Set of Challenges; A Report of the American Psychological Association, Task Force on the Interface between Psychology and Climate Change* (n.p.: American Psychological Association, 2009).
25. André Bazin, *What Is Cinema?* trans. Hugh Gray (Berkeley: University of California Press, 1967), 17–18, 21.
26. Brian Winston, *Technologies of Seeing: Photography, Cinematography, and Television* (London: British Film Institute, 1996), 40–43; Brian Winston, "Let Them Eat Laptops: The Limits of Technicism," *International Journal of Communication* 1 (2007): 170–76; Peter Wollen, "Cinema and Technology: A Historical Overview," in *The Cinematic Apparatus*, ed. Teresa de Lauretis and Stephen Heath (Basingstoke: Macmillan, 1985), 19. The secondary sources on this come from a valuable if maverick figure within screen studies (Winston) and a valuable if maverick moment within screen studies (when Althusserians and others briefly undertook archival research projects on technology).
27. Paul Virilio, *War and Cinema: The Logistics of Perception*, trans. Patrick Camiller (London: Verso, 1989); Steve Neale, *Cinema and Technology: Image, Text, Ideology* (Chicago: University of Chicago Press, 1985).
28. Julie A. Reilly, "Celluloid Objects: Their Chemistry and Preservation," *Journal of the American Institute for Conservation* 30, no. 2 (1991): 145–46.
29. George A. Blair, "The Development of the Motion Picture Raw Film Industry," *Annals of the American Academy of Political and Social Science* 128 (1926): 50–53.
30. Ibid.; George Eastman House, "Pumping Station at Kodak Park Connected with Private Water Supply System of 12,000,000 Gallons Daily Capacity," Still Photograph Archive, Catalog Record 87:0026:0029.
31. Eileen Bowser, *History of the American Cinema*, vol. 2, *The Transformation of Cinema, 1907–1915* (New York: Charles Scribner's Sons, 1990), 21–36; Great Lakes Commission des Grands Lacs, "Liquid Asset: Great Lakes Water Quality and Industry Needs," 1992, glc.org/docs/liqasset/liqasset.html;

Michael I. Niman, "Kodak's Toxic Moments," Alternet.org, May 29, 2003, alternet.org/story/16030/; *Atlantic States Legal Foundation v. Eastman Kodak Co.*, 12 F.3d 353 (2d Cir. 1994).

32. Louis H. Bean, "Changing Trends in Cotton Production and Consumption," *Southern Economic Journal* 5, no. 4 (1939): 442–59.

33. "Twilight City—Where Snapshots Are Born," *Modern Mechanix and Inventions*, February 1936, 84–86, 122.

34. Blair, "The Development"; Reilly, "Celluloid Objects," 147.

35. "Twilight City."

36. Blair, "The Development"; Reilly, "Celluloid Objects."

37. Blair, "The Development"; United States Department of the Interior, *2006 Minerals Yearbook, Silver*; United States Geological Survey (n.p.: United States Department of the Interior, April 2008).

38. Dartmouth Toxic Metals Research Program, *The Facts on Silver*; Dartmouth College, Center for Environmental Health Services, dartmouth.edu/~toxmetal/TXQAag.shtml.

39. Sue Bowden and Geoffrey Tweedale, "Poisoned by the Fluff: Compensation and Litigation for Byssinosis in the Lancashire Cotton Industry," *Journal of Law and Society* 29, no. 4 (2002): 560–79; W. Kip Viscusi, "Cotton Dust Regulation: An OSHA Success Story?" *Journal of Policy Analysis and Management* 4, no. 3 (1985): 325–43.

40. "Test-Tube Love Seat," *Time*, February 26, 1940, time.com/time/magazine/article/0,9171,763265,00.html.

41. Carlos Bustamante, "AGFA, Kullmann, Singer & Co. and Early Cine-Film Stock," *Film History* 20, no. 1 (2008): 59–76.

42. Institute of Pacific Relations, "Memorandum on Silver," *Memorandum* 2, no. 22 (1933); "The Smelter Trust and Mexican Silver—Believed the Complete Control of the Silver Mining Industry of Mexico Is Contemplated," *New York Times*, April 27, 1903, 2; Dickson H. Leavens, "The Distribution of the World's Silver," *Review of Economics and Statistics* 17, no. 6 (1935): 131–38; Milton Friedman, "Franklin D. Roosevelt, Silver, and China," *Journal of Political Economy* 100, no. 1 (1992): 62–83.

43. Walter A. Durham Jr., "The Japanese Camphor Monopoly: Its History and Relation to the Future of Japan," *Pacific Affairs* 5, no. 9 (1932): 797–801; Reilly, "Celluloid Objects," 149.

44. "Formosa Plastics: A Briefing Paper on Waste, Safety and Financial Issues, Including U.S. Campaign Finance Abuses," n.d., Waverly, MA: Strategic Counsel on Corporate Accountability.

45. "Kodak Rewrites the Book on Printing," *Business Week*, September 4, 2006; Niman, "Kodak's Toxic Moments"; Vance McCarthy, "Kodak—A Picture of Nano-Driven Innovation," Nano Science and Technology Institute, Austin, 2007, nsti.org/news/item.html?id=179.

46. "Moguls to Direct Film's Future," *Financial Times*, November 29, 2006, 14.

47. Science and Technology Council of the American Academy of Motion Picture Arts and Sciences, *The Digital Dilemma: Strategic Issues in Archiving and Accessing Digital Motion Picture Materials* (Los Angeles: Academy Imprints, 2007), 33–50.

48. Basel Action Network and Silicon Valley Toxics Coalition, “Exporting Harm: The High-Tech Trashing of Asia,” 2002, <http://www.ban.org/E-waste/technotrashfinalcomp.pdf>; Basel Action Network, “JPEPA as a Step in Japan’s Greater Plan to Liberalize Hazardous Waste Trade in Asia,” 2007, http://www.ban.org/Library/JPEPA_Report_BAN_FINAL_29_Aug_071.pdf; Xin Tong and Jici Wang, “Transnational Flows of E-Waste and Spatial Patterns of Recycling in China,” *Eurasian Geography and Economics* 45, no. 8 (2004): 608–21; Coby S. C. Wong, S. C. Wu, Nurdan S. Duzgoren-Aydin, Adnan Aydin, and Ming H. Wong, “Trace Metal Contamination of Sediments in an E-Waste Processing Village in China,” *Environmental Pollution* 145 (2007): 435, 441; Manas Ranjan Ray, Gopeshwar Mukherjee, Sanghita Roychowdhury, and Twisha Lahiri, “Respiratory and General Health Impairments of Ragpickers in India: A Study in Delhi,” *International Archives of Occupational and Environmental Health* 77 (2004): 595–98; O. Osibanjo and I. C. Nnorom, “The Challenge of Electronic Waste (E-Waste) Management in Developing Countries,” *Waste Management and Research* 25 (2007): 489–501; Richard Maxwell and Toby Miller, “Green Smokestacks?” *Feminist Media Studies* 8, no. 3 (2008): 324–29; Martin Medina, *The World’s Scavengers: Salvaging for Sustainable Consumption and Production* (Lanham, MD: AltaMira, 2007).

49. Political Economy Research Institute, *The Misfortune 100: Top Corporate Air Polluters in the United States* (Amherst: University of Massachusetts, 2004).

50. News Corporation, “0 by 2010,” newscorp.com/energy/index.html.

51. Leslie Kaufman, “Car Crashes to Please Mother Nature,” *New York Times*, March 2, 2009, nytimes.com/2009/03/02/arts/television/02twen.html; Dan Glaister, “Jack Bauer Saves the World Again: 24 Goes Carbon Neutral,” *Guardian*, March 3, 2009.

52. Warner Brothers Studio, “Environmental Initiatives,” wbenvironmental.warnerbros.com.

53. For a list of “best practices,” see Emma Gardner, *Developing an Environmental Strategy for UK Film* (n.p.: UK Film Council, 2007).

54. Ibid.; ukfilmcouncil.org, “Environmental Strategy,” ukfilmcouncil.org.uk/environmental.

55. Science and Technology Council of the American Academy of Motion Picture Arts and Sciences, *The Digital Dilemma*, 51–54.

56. Maxwell T. Boykoff and Michael K. Goodman, “Conspicuous Redemption? Reflections on the Promises and Perils of the ‘Celebritization’ of Climate Change,” *Geoforum* 40 (2009): 395–406; Peter Wells and Liz Heming, “Green Celebrity: Oxymoron, Fashion or Pioneering Sustainability?” *International Journal of Innovation and Sustainable Development* 4, no. 1 (2009): 61–73; Andrew Balmford, Andrea Manica, Lesley Airey, Linda Birkin, Amy Oliver, and

Judith Schleicher, "Hollywood, Climate Change, and the Public," *Science* 305 (2004): 1713.

57. W. L. Liu, C. F. Shen, Z. Zhang, and C. B. Zhang, "Distribution of Phthalate Esters in Soil of E-Waste Recycling Sites from Taizhou City in China," *Bulletin of Environmental Contamination and Toxicology* 82 (2009): 665–67.