

***AI in the Wild: Sustainability in the Age of Artificial Intelligence.* By Peter Dauvergne. Cambridge, MA: MIT Press. 2021. 276 pp. Paper \$24.95.**

***Blockchain Chicken Farm and Other Stories of Tech in China's Countryside.* By Xiaowei Wang, New York: Farrar, Straus, and Geroux. 2020. 256 pp. Paper \$17.00; e-book \$10.99.**

***A City Is Not a Computer: Other Urban Intelligences.* By Shannon Mattern. Princeton, NJ: Princeton Univ. Press. 2021. 200 pp. Paper \$19.95; e-book.**

Nnedi Okorafor's short story "Mother of Invention" (2018) brings into focus several key thematics in the scholarly studies of ecology and AI. Set in near-future Nigeria, Okorafor imagines a moment when a sophisticated smart home becomes a life-saving extension of an expectant mother's immune system. The protagonist, Anwuli, goes into labor during a pollen storm caused by a GMO crop of peri grass, a nutritious substitute for rice whose pollination cycle has been thrown off by climate change. Yet the smart home has a kind of external immune system—and womb—that protects Anwuli and her child from the worst of the pollen storm, able to learn and adapt to the changing situation. It filters both pollen and information, sifting through data and shutting out the harmful peri grass.

Okorafor's story animates the intimacies between AI and ecology in a variety of important ways. It centers uses of AI technology located in the global South, not just the study of extractive effects on the global South. Given the overrepresentation of global North—and especially Silicon Valley—in imaginations of AI futures, this alone would merit critical consideration. Yet Okorafor also sets "Mother of Invention" against the backdrop of industrial farming, surveillance, trust, and

care work. By imagining how a smart home would help a pregnant woman, Okorafor places gender and reproduction at the center of considerations of AI, imagining how it could help mediate between the protagonist's immediate health concerns and the miasma of a climate catastrophe swirling outside. "Mother of Invention" is a story that encourages us to consider who gets to imagine the future(s) of AI design and who such futures prioritize and care for. What geographies do AI futures center? In what ways does an ecological imagination animate descriptions and conceptualizations of AI and other smart technologies?

In this review, I examine three books that take up these questions to varying degrees: Xiaowei Wang's *Blockchain Chicken Farm and Other Stories of Tech in China's Countryside*, Shannon Mattern's *A City Is Not a Computer: Other Urban Intelligences*, and Peter Dauvergne's *AI in the Wild: Sustainability in the Age of Artificial Intelligence*. Rather than opposing ecology to technology, these texts trace their intimacies: the application of AI to the management of wildlife and animal husbandry, the connections between AI and global food systems, the ways that AI draws on elements of the natural world for algorithmic models—a reminder to readers to look for ecological relation in all human relationships with technologies and that the technological always requires material inputs of energies, resources, and labor. Taken together, these three books prompt us to decenter Silicon Valley–focused ways of mapping, predicting, and especially desiring particular relationships between ecologies and AI. They also map out a spatial trajectory that evaluates AI's ecological implications in the wild, the agrarian, and the urban, considering how each of these spaces presents differing ratios and arrangements of human and more than human life.

AI and Wild Ecologies

Peter Dauvergne begins *AI in the Wild: Sustainability in the Age of Artificial Intelligence* (2020) by positioning his book as the first of its kind to bring together the fields of global environmental politics and AI. Dauvergne, a professor of international relations, asserts that, "at the time of writing, no articles dealing with AI have ever been published in the field's leading journals of *Global Environmental Politics* and *Environmental Politics*" (12). Mapping the field further, he adds that "MIT Press, which has published hundreds of books on artificial intelligence and hundreds of books on environmental politics, has

never published a book bringing these two topics together” (12). However, Dauvergne missed works that do not use *AI* directly in their title, including many contributions in the field of media studies, such as Tung-hui Hu’s *Prehistory of the Cloud* (2015), Jennifer Gabrys’s *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet* (2016), Xiaowei Wang’s *Blockchain Chicken Farm* (2018), which I review next; Kate Crawford’s *Atlas of AI* (2018) (which does use *AI* in the title); Mél Hogan’s work on the global ecological impacts of data centers, including the 2018 article “Big Data Ecologies.” Additional engagement with ecology and AI emerges in such contemporary artworks as Lawrence Lek’s *AIDOL* (see lawrencelek.com/AIDOL), which addresses AI and climate change from a Sino-futurist perspective.

Nonetheless, *AI in the Wild* offers a valuable critique of corporate sustainability. One of its central observations is that corporations typically use AI toward increasing the efficiency of production, not toward reducing total resource consumption. Dauvergne writes that ecobusiness is “aiming to expand markets, sales, and corporate power. Most of the efficiency gains are rebounding into even more production and consumption” while AI continues to assist industrial-scale extraction “from autonomous drilling to driverless haulers” (15). Dauvergne is right to point out that what remains unexamined by corporations is the logic of increased production and consumption in the first place, which contributes to increased resource use and carbon emissions, habitat destruction, and species extinctions. Dauvergne argues that, for these reasons, corporate sustainability initiatives are not truly effective on their own and suggests greater civic attention to decrease consumption. On this point, Dauvergne is largely in agreement with professor of industrial ecology Roland Geyer, whose book *The Business of Less: The Role of Companies and Households on a Planet in Peril* (2021) also leverages a strong critique of corporate sustainability measures.

However, the persons and organizations that Dauvergne is most critical of (big tech corporations) are also the ones he gives the most attention throughout the book. Despite his call at the end of the book for environmental activists to do more, they are proportionately a small fraction of the quotations that Dauvergne uses, and he does not name specific environmental activist organizations in his calls to action. By contrast, he tracks many corporations in depth and tends to use citations from business leaders to map out the ideology of Silicon Valley.

In this way, *AI in the Wild* risks becoming a biography of the powerful, written as a synthesis of trends that may be familiar to anyone who follows *Wired*, *Gizmodo*, or Reddit. However, since not everyone does, *AI in the Wild* may usefully map a number of corporate actions in the last decade that may have slipped under one's radar, such as Apple's acquisitions of Emotient and RealFace or its test driving of autonomous cars.

Importantly, *AI in the Wild* synthesizes a number of shifts in the way AI is being used toward wildlife conservation. For example, Trailguard AI takes photographs of vehicles entering national parks and sends them to park headquarter to investigate, as part of a strategy of arresting illegal poachers. ChimpFace searches social media and websites for trafficked chimpanzees; Wildbook searches YouTube for footage of whale sharks. Rangerbot has been used in the Great Barrier Reef to cull crown-of-thorns starfish that are destroying corals while also mapping coral bleaching and sampling seawater. However, what is missing here is an evaluation of how these applications of AI technologies in the wild relate to other trends that Dauvergne maps out in later chapters, such as how machine learning and intelligent automation will expand state power (chapter 10). For example, isn't the power to cull masses of crown-of-thorns starfish an example of already expanded state power, of bare life and the right to kill?

The effort to map and survey results in the stylistic deployment of quite a few lists in *AI in the Wild*. For example, on energy efficiency, Dauvergne summarizes: "City-owned vehicles are being integrated into the Internet of Things to improve data analysis and response times. City infrastructure is being automated to increase the efficiency of subways, buses, streetlights. . . . Police are being outfitted with smart cameras to improve the safety of officers and citizens" (103). The frequency with which Dauvergne uses lists written in the passive voice ("are being . . .") becomes repetitive and contributes to a textbook-like distance from the subject matter, an overview that avoids the use of the *I* (although *we* is still frequently used). While this approach offers a degree of clarity, it also obscures Dauvergne's own positionality, a lost opportunity to reflect on his own embedding within systems of power and privilege.

AI in the Wild is divided into three parts: "The Global Political Economy of AI," "The Prospects and Limits of AI," and "The Dangers of AI." Each of these parts collects several chapters that examine the rise of AI since 2010 and examples of applications in wildlife conservation and ecoefficiency. However, one disadvantage is that terms like

sustainability, global, smart, and wild are not critically defined in this volume. Dauvergne also leaves his most critical and interesting chapters until the end of the book, covering surveillance (chapter 10) and the dire environmental implications of war and global conflict (chapter 11). This has the unfortunate effect of burying the lede in an attempt to anticipate a technoenthusiast audience—the kind of audience that would think to check MIT Press’s catalogue and is likely positioned in the global North, if not in Silicon Valley itself.

Because Dauvergne does not immediately foreshadow his critiques, much of his prose inhabits the mode of the technosublime. Indeed, Dauvergne starts each chapter by introducing applications of AI that seem to dovetail with sustainability goals. These paragraphs appear written as if to sympathize with the point of view of a particular reader: a generalist, corporate, technoenthusiast audience that wants to use AI for positive outcomes. The problem with this strategy, from my view, is that he saves his critiques for other paragraphs, making it possible for an uncaredful reader to quote either the passages that read as particularly technosublime and optimistic or the critical passages that often come later. This organization makes it incredibly easy to cherry-pick quotations, an unfortunate effect of a style of writing that interpolates an anticipated reader who likes AI technologies before offering a more pointed critique, for example, of the double process of subduing radicals and backing environmental (corporate-friendly) moderates (150), a notable observation that I wished he had expanded on with more examples.

AI in the Wild is US-centered while aspiring to be global in scope and thus should also be read carefully for its own geopolitical biases. Dauvergne mostly portrays China as a US antagonist, yet he cites primarily US sources or news sources quoting the CEOs of major Chinese businesses. This citational politics is an effect of the style of the journalistic overview itself, which favors a quick gloss and tends to cite actors with more power. This leaves something to be desired, however, about really understanding China—and indeed, the other global superpowers mentioned—from other points of view.

AI and Agrarian Ecologies

Xiaowei Wang’s *Blockchain Chicken Farm* irreverently contrasts the technohype of blockchain encryption technologies against their applications in rural and farming/agricultural contexts. While the book is not published with an academic press, it models a type of public

humanities scholarship that bears the marks of Wang's training at Harvard (undergraduate, MA) and UC Berkeley, where Wang was a PhD student in geography at the time of writing this book. Yet most important, *Blockchain Chicken Farm* offers one of the only examples of scholarship on ecology and AI from a perspective in the global South that I could find, to date. Wang examines not only detrimental AI effects on rural China, but also AI uses by people living in rural China, telling a more complex story of technology and agency than victimhood, against the particular backdrop of Chinese history and cultures. By contrast, texts like *AI in the Wild* and Kate Crawford's *Atlas of AI* tend to address the global South as the passive subject of ecological damage by technologies designed in the global North. While mapping geographies of harm is important work, it is only half of a rigorous environmental justice agenda, which should examine not only victimization but also the desires, hopes, and aspirations of particular communities as users, adapters, and designers of AI and its associated functions: machine learning technologies, data management, and storage. *Blockchain Chicken Farm* models how to approach questions of ecology and AI by asking the crucial question of "for whom," countering tendencies to see AI as a story only about Silicon Valley, US corporations, cities, and the affluent and instead approaching AI from the perspectives of Chinese farmers and others living in rural contexts.

Food is, unsurprisingly, at the center of *Blockchain Chicken Farm*. Wang begins the book, "Famine has its own vocabulary, a hungry language that haunts and lingers. My ninety-year-old great-uncle understands famine's words well. When I visit him one winter, he takes me on an indulgent trip to the food court near his house. . . . My visit is special, so I know his affection will be communicated through food, from his own memory of hunger" (11). This indirect way of alluding to the famine of the Great Leap Forward opens the book, a memory of the attempt to technologically modernize and a reminder of how "intertwined the rural and urban are, with technological change threaded throughout" (22). *Blockchain Chicken Farm* is both a series of case studies of AI applications in agriculture and animal husbandry and a close examination of circulations between rural and urban environments.

Food also shapes *Blockchain Chicken Farm*'s textual form. Between the book's eight nonfiction chapters, incorporating fieldwork and ethnographic interviews, are three short speculative recipes that function

like speculative fictions and could easily be adapted as contemporary artwork for the way that they challenge and critique dominant assumptions about AI and the body. For example, in “How to Feed an AI,” Wang asks, “How would moving beyond the machine-human boundaries and western models of mind-body dualism bring new life to AI research? This recipe speculates on just that—when a group of AI researchers use traditional Chinese medicine . . . to advance technology” (31). Wang uses this recipe for giving a goji berry, ginger, date, and soy milk broth to an AI as an occasion to counter Western assumptions about how bodies are built. Whereas in Western philosophies the brain controls the body, “in Chinese medicine, there are eleven vital organs that work holistically to sustain life, and this list does not include the brain. Brain functions are scattered throughout the body” (32). In asking what AI research would look like if it proceeded from this distributed model of cognition, Wang might find synergy with N. Katherine Hayles’s *Unthought: The Power of the Cognitive Nonconscious* (2017). A careful reader might also consider the similarities between the form of an algorithm and the form of the recipe: both are step-by-step instructions used to accomplish a task or create a dish, taking inputs (code, ingredients) and combining them to create outputs (a program, a cake).

In addition to the Buddhist alternatives to the mind-body dualism, Wang makes space for other rural epistemologies to show through. For example, early on, Wang discusses noncapitalist perspectives on time: “One farmer told me that the future is a created concept, and that in the fields, in the long dark of winters, there is no future, because every day depends on tending to the present moment. An act of care. In contrast, urban culture is centered on the belief that the universe must be constantly corrected on its course, and that life is defined by the pleasure of overcoming future challenges” (26). While one might wonder if there are exceptions to this dualism, such as instances of care and being present that coexist in urban spaces, Wang channels a sense that rural epistemologies are shifting as these spaces become satellites of the urban, geographically and cognitively.

Throughout *Blockchain Chicken Farm*, Wang tracks a number of moments when internet commerce, blockchain encryption, surveillance technologies, and AI have reshaped the environments, ecologies, and economies of rural China. Summarizing Xi Jinping’s policies for rural revitalization, Wang writes: “The new socialist countryside will be filled with peasants starting e-commerce businesses, small-scale

manufacturing, new data centers, and young entrepreneurial workers returning to their rural homes. Rural Revitalization envisions the use of blockchain and mobile payment to catalyze new businesses, and will leverage big data for poverty relief and distribution of welfare benefits” (22). This forecast imagines a shift in labor from cities back to the countryside, addressing such social problems as children living apart from their aging parents so they can live where jobs exist. In another chapter, Wang tells a story about a shift in costume manufacturing to a small town. “It feels bizarre: a group of children trick-or-treating in suburban America is fueling the growth of fruit trees and chili peppers in Shandong, and also driving land rentals. The internet is tangibly reshaping Dinglou’s environment” (191). The feeling of the bizarreness seems to be a recurring affective response to rural environmental reshaping and change, the sense that the city’s—and, by proxy, AI’s—ways of knowing and socializing are impinging onto those of the Chinese countryside.

Part of this changing socialization also has to do with how AI is coming to substitute for trust and, in doing so, to reflect a very narrow and particular view of human nature. For example, in the titular chapter, “Blockchain Chicken Farm,” Wang traces how blockchain technologies are being used to mediate and guarantee that one’s chicken is, in fact, free range, vegetarian fed and not a counterfeit. “When falsified records and sprawling supply chains lead to issues of contamination and food safety,” Wang writes, “blockchain seems like a clear, logical solution” (50). At one farm, chickens wear ankle bracelets (with QR codes) that track their number of steps and location, data that are accessible on a website where you can even see a map of their movements. When the chicken is butchered, the anklet is left on the chicken so that the purchaser can verify that they have in fact bought the right chicken.

The figure of the blockchain chicken farm operates on both comical and pragmatic levels. While it ensures delivery of an organic chicken, it also registers a kind of absurdity, indexing a level of social distrust that requires permanent chicken anklets and surveillance tracking. The question of trust and the counterfeit appears in other moments of the book, such as the discussion of Alipay, pearl farms, and the existence of *shanzhai* (knockoff) products. Yet here, Wang provocatively reclaims the derogatory term *shanzhai*, casting it not as a fault but as potentially a mode of decolonizing technology, of redefining what innovation might mean in rural China. Here Wang raises an interesting question: is the antidote to the absurdity of the blockchain chicken

farm an embrace of the socialist potential of the counterfeit, to reclaim the means of production?

AI and Urban Ecologies

Moving from the wild to the agrarian, I conclude by turning to a book that situates ecology and AI squarely in the terrain of the city—a perhaps unexpected place to look: Shannon Mattern’s *A City Is Not a Computer*, which dynamically moves across questions of environment, abstraction, and form. It begins with a quotation from Christopher Alexander, “A city is not a tree,” evaluating Alexander’s negative metaphor as it shuttles between artificial cities (the treelike plans of designers) and the messiness of actual cities (not trees). Perhaps a sense of surprise comes from how *tree* is not a tree either but an abstracted structure or form of organization—a form that nonetheless borrows from an ecological referent. As Mattern observes, we have implemented computational means to achieve neatness and order in cities, “now rationalized through exhaustive data collection, automated design tools, and artificially intelligent urban systems. We’re using ‘decision trees’ to cultivate ‘tree cities’” (3).

Smart cities are abstractions that borrow from an ecological, material, and often arboreal vocabulary to conceptualize the city as a site of management and observation. However, Mattern’s discussion of smart cities raises key questions about how computational models have come to define cities, and what these models leave out. She argues that “‘smart’ computational models of urbanism advance an impoverished understanding of what we can know about a city, as well as what’s worth knowing,” since “cities encompass countless other forms of local, place-based, indigenous intelligences and knowledge institutions” (12).

A City Is Not a Computer is structured by four chapters: “City Console,” “A City Is Not a Computer,” “Public Knowledge,” and “Maintenance Codes.” Throughout, Mattern shows that underneath the veneer of the computational, algorithmic, and artificially intelligent is a material, ecological, and cultural substratum that informs AI at the level of conceptual vocabulary: the tree, the graft, the dashboard.

One of the strengths of this book is how it carefully shuttles between the material and semiotic, attending to key differences in which each operates. One of the most delightful examples of this occurs in chapter 1, “City Console” (a homonym for city council), where Mattern traces the concept of the dashboard back to its original technical

and environmental context and then back-reads this onto a technical situation in the present for comparative analysis. She begins:

The term *dashboard*, first used in 1846, originally referred to the board or leather apron on the front of a vehicle that kept horse hooves and wheels from splashing mud into the interior. Only in 1990, according to the *Oxford English Dictionary*, did the term come to denote a “screen giving a graphical summary of various types of information, typically used to give an overview of (part of) a business organization.” (30)

Mattern then perceptively asks what has been bracketed out of the concept of the dashboard. “Why, all the mud of course! All the dirty (un-‘cleaned’) data, the variables that have nothing to do with key performance (however it’s defined), the parts that don’t lend themselves to quantification and visualization”—this data-mud is what the dashboard “screens out” (30–31). However, Mattern argues that the mud is what the critic must notice. Because the dashboard “does little to educate those users about where the data come from, about whose interests they serve, or about the politics of information visualization and knowledge production” (42), the critic must figuratively look behind the face of the dashboard to examine what was excluded. What Mattern calls “Critical Mud” means seeing the city as more than an “aggregate of variables, as the sum of its component widgets—weather plus crime statistics plus energy usage plus employment data” (43). What might the city look like if one pays attention to multi-species inhabitants, or to physical dirt itself? This latter question resonates with questions being asked by scientists of the Anthropocene like Daniel Richter (2007), who study significant changes happening in Earth’s soils, including soils that underlie cities and other built spaces.

Mattern also examines how the metaphorization of the city as a kind of computer not only shapes what we want to know about cities—what types of civic data are valued—but also obscures the origins of data (represented to or fed to the computer of the city). For Mattern, the city-as-computer metaphor risks treating city-data as a given and thus depoliticizing it. Thus, “we need to shift our gaze and look at data in context, at the life cycle of urban information, distributed within a varied ecology of urban sites and subjects that interact with it in multiple ways. We need to see data’s human, institutional, and technological creators, its curators, cleaners and preservers, owners and brokers, ‘users,’ hackers and critics” (64). This call for scholarly remembering

and analysis of where data come from—a call in line with Lisa Gitelman’s *Raw Data Is an Oxymoron* (2013)—should be a central lesson for those studying the relations of AI and ecology.

One of the ways that Mattern refocuses questions of where data come from and who they are for occurs in her discussion of the role of libraries in smart cities. In chapter 3, Mattern examines how libraries can be viewed as platforms or, her preferred term, *infrastructures*. Where the platform (like the dashboard interface) “doesn’t have any implied depth” and we are not “inclined to look beneath it or behind it, or to question its structure or logics” (77), infrastructure offers a different understanding of dimensionality. Mattern tracks the social justice implications for how the library functions as a knowledge infrastructure and a social infrastructure—one that provides critical services, especially for those marginalized populations who are either irrelevant to or criminalized by the smart city’s all-seeing sensors and all-knowing databases (78). The library is a social and environmental model: “Imagine what a library could be if it, rather than a police dashboard or an urban operating system, were taken as the quintessential emblem of urban intelligence” (83). Unlike the dashboard, the infrastructure of the library can accommodate “forms of media and types of knowledge that resist standardization and metrics, that might stymie standard classification schemes” (85) such as zines, comics, and local culinary, cultural, business, and design histories.

Chapter 4, “Maintenance Codes,” shares a thematic overlap with *Blockchain Chicken Farm* by centering themes of maintenance and care, and their situation within specific communities. Mattern advocates for maintenance over innovation, noting that maintenance is a collective endeavor that isn’t new, drawing on ecological metaphors: “Spiders have long been repairing their webs and birds their nests” (108). Yet importantly, she examines how practices of maintenance remind us to pay attention to “what, exactly is being maintained” (116), for example, infrastructures of colonialism, or neglected infrastructures that provide clean water, or infrastructures that are both. In some cases, Mattern suggests advocating for “curated decay,” such that “not every road or dam *should* be repaired” (123) when at odds with caring for important ecological contexts. In a capacious way, Mattern puns on maintenance codes as both literal computer code and a more figurative sense of code—the way we might embed our values into maintaining (or retiring) infrastructures, including data storage and curation, concluding with an invitation to imagine grafting (an arboreal metaphor), data planting, and data planning, where the really

smart city incorporates the “wisdom ingrained in its trees and statuary, its interfaces and archives, its marginalized communities and more-than-human inhabitants” (154). Importantly, Mattern asks, “How can we position ‘care’ as an integral value within the city’s architectures and infrastructures?” (123).

“Mother of Invention”

The element of care is central to Nnedi Okorafor’s short story “Mother of Invention” that I began with, yet it was an accidental, even unplanned, instance of care. In the face of a failure of environmental planning, where the GMO crop of peri grass causes unplanned pollen tsunamis, and in the face of a community that rejected Anwuli for her unplanned pregnancy, the smart home Obi-3 ultimately reengineers itself to protect Anwuli and her child from the pollen storm. When Anwuli asks how it did this, Obi-3 responds:

Every smart home watches the news, its central person, and its environment. Nearly one-third of all pregnant women will develop an allergy they have not previously suffered from, and the allergies they already have tend to get worse. You have always had bad allergies; you told me how they used to call you *ogbanje*. Also, remember the day your stupid, useless man left? You turned off my filter *because* he liked to have it on.

In this passage, we discover that Obi-3 has been able to care for Anwuli because she disabled its privacy filter and allowed it to monitor all of her activities. Even though the reader might be tempted to celebrate Obi-3’s care for Anwuli, it is possible only because she has given it unimpeded access to her data, to infer her needs. It is an optimistic view of AI as a buffer between ecological disaster and biological needs, of AI as a kind of prosthetic immune system to insulate against hostile environments.

Yet this might not always be the case. The future of AI and ecology will need to evaluate how much to let AI into our lives and ecologies, especially when it echoes practices tied to state power, surveillance, or datafication. After reading *AI in the Wild*, we should be asking why conservation organizations embrace the use of surveillance technologies on wildlife when social justice groups would shudder at the use of these same technologies on human populations. *Blockchain Chicken Farm* should prompt us to ask how those in rural environments are adapting AI technologies for their own uses at the same time as those

same technologies are reshaping relationships and foodways. *A City Is Not a Computer* reminds us to examine the metaphors and data that make possible any AI representation of the world—not only their energy cost but also the life forms and ecologies that undergird fluid and botanical figurations.

Melody Jue is an associate professor of English at the University of California, Santa Barbara. She is the author of *Wild Blue Media: Thinking Through Seawater* (2020), which won the 2020 Speculative Fictions and Cultures of Science book award, and is co-editor with Rafico Ruiz of *Saturation: An Elemental Politics* (2021).

Reference

Richter, Daniel deB. 2007. "Humanity's Transformation of Earth's Soil: Pedology's New Frontier." *Soil Science* 127, no. 12.