The Ravenous Cloud: Artificial Intelligence and the New Extractive Economy

From Mines and Water to Data and Waste: How Artificial Intelligence Reveals a New Face of Environmental Justice and Technofeudalism

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(Article originally published in Arabic https://180post.com/archives/65169)

Artificial Intelligence (AI) is often presented as a lightweight technology living in the cloud: models that write, predict, generate images, and answer questions in moments. This image appears clean and abstract, as if AI needs nothing more than an algorithm and some data. But the cloud is not a weightless space. It is a massive physical infrastructure of mines, chips, data centers, power plants, cooling systems, fiber-optic networks, water, and human labor. Therefore, it is not enough to ask whether AI has become faster, cheaper, and more efficient. The more important question is: who owns this infrastructure? Who benefits from it? And who bears its environmental and social impacts?

Just as commodities in the market once concealed the labor relations and nature that produced them, the algorithm today hides the material relations that make it possible. This is what can be termed "algorithmic fetishism": the answer appears on the screen as if it were the product of an independent, artificial mind, while it is actually the result of a network of human labor, energy, water, minerals, infrastructure, and deferred pollution. Here begins the ideological illusion of AI: it not only hides what it consumes but also conceals the power relations that organize this consumption.

From this perspective, AI does not appear merely as a technological revolution, but emerges as a new extractive economy. It transforms minerals, water, energy, labor, and data into cloud value, while distributing pollution and risks to communities least capable of resisting. It is not just a digital tool, but a material and political chain that begins in the mine, passes through the chip and data center, reaches the model, and ultimately returns in the form of electronic waste, financial accumulation, and cloud power. To fully unpack this complex network, we can deploy three complementary theoretical frameworks, each prompting a distinct line of investigation:

- Environmental Justice helps us ask the first question: who bears the harm?
- Marxist Ecology helps us ask a deeper question: why does the system treat nature as a cheap input and a dumping ground for external costs, harms that do not appear on a company's balance sheet but are instead borne by society, the environment, or future generations?
- Technofeudalism (as articulated by Yanis Varoufakis) adds a third question: who owns the cloud infrastructure upon which others have come to depend, and who extracts rent from this dependence?

Through these three lenses, AI becomes more than a technology; it becomes a condensed expression of a new relationship between nature, power, and profit.

Environmental Justice and the Metabolic Rift

Environmental justice is based on a simple principle: no human group, by virtue of poverty, race, origin, or lack of political power, should bear an unfair share of pollution and environmental risks. When applying this principle to AI, the questions emerge clearly: where are data centers built? Who consumes water and energy? Who lives near the generators and gas turbines? Whose land is polluted by mineral extraction? And who ultimately gains the profits and power?

John Bellamy Foster, in his ecological reading of Marx, revived the concept of the "metabolic rift" as a central idea in the critique of capitalism. Marx understood human labor as a metabolic interaction between society and nature: a material exchange where society takes minerals, water, energy, and labor from the earth, and returns to it waste, pollution, and emissions. When capitalism separates this exchange from the conditions of its natural renewal, value accumulates at the center, while fertility, water, labor, or health are depleted at the periphery.

AI deepens this metabolic rift by separating apparent intelligence from the hidden extraction that makes it possible. The user sees a clean screen and a fast response, but does not see the cobalt mine, the semiconductor factory, the water used for cooling, the electricity required for operation, or the toxic e-waste left behind when devices become obsolete.

Therefore, it is not enough to say that AI needs nature; it is more accurate to say that it needs it cheap, silent, and compliant. It needs water whose full environmental cost is not calculated, electricity whose health impact does not reflect in the query price, minerals whose extraction depletes local communities, and data whose owners are unrecognized by the system. In this sense, the cloud is not the antithesis of nature, but a new way of repricing nature, labor, and knowledge at less than their true value.

Here appears what Foster and Brett Clark call the "robbery of nature": capital treating water, air, soil, minerals, and human capacity to work as free or nearly free gifts. These gifts do not appear in the price of the digital service, just as profits appear on corporate balance sheets. Consequently, the response generated by the model appears cheap, even though it is saturated with structural costs that neither the user nor the company fully pays.

This disconnect in the consumption and distribution of vital resources brings to mind classic environmental justice cases recorded in the United States, such as the Flint Water Crisis and the water shutoff policies in debt-ridden Detroit, where the rights of marginalized communities were historically sacrificed for fiscal austerity and large corporate interests. Today, the exact same pattern repeats geographically; local communities in water-stressed regions face unfair competition from massive server farms that devour millions of gallons of fresh water daily just to cool the processors of large language models, sacrificing human water security for the sake of sustaining the digital cloud.

From the Mine to the Chip: The Canary in the Digital Coal Mine

AI does not begin when a user types a command into a chat window. It begins long before that, in the earth itself. Chips, servers, networks, batteries, and cooling systems rely on materials such as copper, lithium, cobalt, nickel, graphite, and rare earth elements. These materials do not usually appear in AI discourse, but they are part of its true structure. The cloud is not the opposite of the mine, but an extension of it.

The imagery of the digital "canary in the coal mine" can be used here. In old mines, the canary served as an early warning sign of danger: if the bird died, workers knew the air had become toxic. Today, mining communities in the Global South can be seen as the canaries in the coal mine of the AI era. What happens in the cobalt mines of the Congo, the lithium regions of the Andes, or near rare earth element processing zones is an early warning that AI, if left to the logic of the market alone, will reproduce the same extraction under new names.

Historically, Marx explained this rift through capitalist agriculture. Food and fiber were transported from the countryside to cities, carrying soil nutrients such as nitrogen, phosphorus, and potassium with them. But these nutrients did not return to the land to renew its fertility; instead, they accumulated in cities as waste and pollution. Thus, the city became a center for the accumulation of value, and the countryside a site for the depletion of life's conditions. When Europe faced a soil fertility crisis, it addressed it by importing guano and nitrates from Peru and Chile, expanding a local rift into a global imperial rift.

What AI does today follows this exact pattern. Instead of soil nutrients, minerals like lithium, cobalt, copper, and rare earth elements are transferred from the global peripheries to centers of computing and profit. Instead of value returning to the communities that bear the pollution and depletion, it accumulates in cloud, chip, and model companies. Thus, the contemporary mine becomes a digital extension of the old metabolic rift: the center accumulates intelligence and rent, while the peripheries bear the depletion and waste.

This pattern reproduces discriminatory and colonial structures that appeared historically in many instances, such as uranium mining on the lands of the indigenous Navajo Nation in the United States during the Cold War. There, lands were depleted to fund the nuclear dawn and build modern power grids for urban centers, leaving the local environment polluted and carcinogenic in what became known as "Wastelanding", the transformation of the geography of politically marginalized communities into waste or dead spaces to justify sacrificing them. Today, the "Lithium Triangle" in the Andes and the mines of the Congo are turning into new wasteland zones under the same pretext: sacrificing the local environment of the peripheries to revitalize the technological luxury of the new cloud centers.

The Algorithmic Bill: The Physical Cost of a Click

To escape "carbon blindness", the reduction of sustainability to greenhouse gas emissions alone, we must examine the real bill for operating this computing infrastructure. The environmental cost of AI is divided into two complementary cycles: the one-time training and creation cycle (Training), and the continuous operation and query cycle driven by user clicks (Inference & Prompting).

In the initial creation stage, training giant language models represents geographically and temporally concentrated environmental pressure. Documented reports from the Massachusetts Institute of Technology (MIT) and the Stanford Institute for Human-Centered Artificial Intelligence indicate that training a classic model like GPT-3 alone consumed nearly 1,287 megawatt-hours of electricity, leaving behind over 502 tons of operational carbon emissions; a cost sufficient to power 120 American homes for an entire year, or equivalent to driving an average car to the moon and back. With the intensifying algorithmic arms race, these numbers have surged dramatically; release documents for the Llama 3 model (70B version) indicate that its training emissions crossed the threshold of 1,900 tons of carbon equivalent, a figure exceeding the lifetime operational emissions of 30 commercial vehicles combined.

However, the real iceberg lies beneath the surface of decentralized daily use. The phase of actual operation and direct answering of user questions (Inference) accounts for a massive share of the total energy a model consumes throughout its life cycle. This cumulative drain translates Rob Nixon's idea of "slow violence": environmental harm that does not appear as a sudden catastrophe, but as a gradual depletion accumulating away from the spotlight.

When a user requests a food recipe or drafts an email, it seems free and instantaneous, but every query requires electricity, cooling, and network infrastructure. Precise measurements show that a single query consumes an average of 2.9 watt-hours of electricity, which is ten times the cost of a traditional search via Google engines (which consumes only 0.3 watt-hours). The hidden consumption of each click, which can release up to 68 grams of carbon dioxide equivalent (CO_2eq) depending on the quality of the energy grid powering the center, accumulates billions of times daily, turning gentle finger taps into a broad front of global warming whose cost is paid by communities geographically remote from air-conditioned computing rooms.

These figures are not just technical metrics; they are measurements of the new social metabolism created by AI. Water and computing power are translated into a cloud service, which is then translated into rent, financial valuations, and monopoly power. Here lies the political issue: nature is not just consumed, it is translated into financial value owned by a few corporations. The drop of water, the atom of lithium, the hour of labor, and the byte of data all become elements in the process of transforming life itself into a monopolizable value.

From Computing Power to Cloud Rent

If Marxist ecology reveals how nature turns into value, technofeudalism reveals who monopolizes the infrastructure through which this value passes. Cloud owners do not just own servers; they own the power to organize access to computing, data, models, markets, and knowledge. In this sense, cloud rent becomes a new form of ecological rent: a rent built on energy, water, minerals, land, labor, and data whose full cost does not appear in the price of the service. The cloud extracts value not from the user alone, but from the earth that makes usage possible.

Ghost Work: The Hidden Human Dimension

Behind the glittering interfaces of artificial intelligence lies a layer of "ghost work" (Ghost Work) that gives the machine the appearance of autonomy and intelligence. These workers are the "human filters" that prevent the internet's toxins from reaching the end user. For language models to appear polite, neutral, and safe for use, they undergo rigorous filtering processes carried out by real humans at the bottom of the digital supply chain, who are forced to confront violent and psychologically damaging material on a daily and continuous basis.

The brutality of this reality is manifest in operating models like the one adopted by the company "Sama" in Kenya, where journalistic investigations revealed that contracted workers were tasked with classifying shocking and disturbing content, including scenes of torture, brutal assaults, and extremist hate speech, to ensure they do not leak into models like ChatGPT. What is shocking here is not just the content, but the financial compensation for this neural drain; these workers received meager wages ranging between only $1.46 and $3.74 per hour. This stark class disparity makes these youths the front line of defense for AI ethics in the West, while they themselves are left vulnerable to post-traumatic stress disorder (PTSD) and severe depression without adequate psychological care.

This practice uncovers another facet of extractive colonialism; just as corporations extract minerals from the lands of the Global South, they now extract psychological stability from the minds of the youth in these communities. Exploiting cheap labor in psychologically toxic working conditions to serve the luxury of users in advanced urban centers is a blatant application of the concept of "Sacrifice Zones", where the mental health of these workers is viewed as an external cost that does not appear on corporate balance sheets.

In this sense, artificial intelligence returns to the paradox formulated by Marx: the accumulation of wealth often occurs through the depletion of its two original sources—the earth and labor. What changes today is that the earth encompasses mines, water, and energy, and labor also includes the hidden data work, classification, and psychological review.

Noise Pollution and the Assassination of Local Serenity

Reducing the environmental impact to invisible dimensions, such as carbon and water, obscures another sensory and direct form of environmental violence practiced by AI: noise pollution (Noise Pollution). Data centers backing algorithmic computing are not silent repositories of chips, but heavy factories buzzing with activity; the thermal greed of GPUs requires massive industrial airflow to prevent overheating. This means cooling servers, cooling towers, industrial air conditioners, and backup generators that run around the clock.

This infrastructure produces a continuous low-frequency hum (Low-frequency Hum) that extends far beyond the facility's walls. The environmental justice dimension manifests here in the geography of site selection; centers are frequently built near low-income neighborhoods or politically marginalized communities, capitalizing on weak local noise regulations that were written mostly to regulate transient sources rather than confront a permanent industrial hum. Local residents live under constant auditory stress that directly impacts sleep, psychological health, and local property values.

The "Colossus" facility of xAI in Memphis, Tennessee, stands out as an example of the convergence of energy, noise, and environmental justice. Located near the historic, predominantly African-American neighborhood of "Boxtown", the facility became the focus of intense criticism regarding its industrial hum, gas turbines, and cumulative environmental burden. In a broader context, residents in various cities have begun filing lawsuits or objections against data centers due to noise and emissions, proving that the industrial hum of AI is no longer a secondary effect, but a live environmental frontline on the ground.

E-Waste: The Toxic End of the Digital Body

If AI begins in the mine, it does not end in the model; it also ends in electronic waste (E-Waste). The race for larger and faster models means rapid hardware turnover: GPUs, servers, storage systems, networking equipment, batteries, and cooling components. What seems like state-of-the-art computing infrastructure today becomes obsolete hardware requiring replacement in a few short years.

The world already produces mountains of e-waste. In 2022, its global volume reached about 62 million tons, and it is expected to hit 82 million tons by 2030, while only about 22% of it was officially documented as collected and recycled. A study in the journal *Nature Computational Science* estimates that generative AI alone could add between 1.2 and 5 million tons of e-waste by 2030, which could reach up to approximately 1% of the total accumulated e-waste globally in high-growth scenarios during this period.

Here, the case of Agbogbloshie in Ghana emerges as a powerful symbol. The region became famous as a massive site for dismantling and burning e-waste and extracting copper and metals from old devices under highly hazardous conditions. Reports and studies on Agbogbloshie point to severe contamination of soil, water, and air with lead, dioxins, and other toxic compounds. The point is to understand it as part of a global chain: a device produced in one place, used in a second, and disposed of in a third.

This non-local distribution of waste represents a globalized extension of the pivotal event that triggered the historical environmental justice movement: the 1982 Warren County case in North Carolina, when authorities decided to landfill soil contaminated with toxic PCBs in one of the poorest, predominantly Black counties in the state. Today, AI reproduces an extended "international Warren County"; the remnants of processors and servers, replaced at an accelerating pace, are dumped in places far from their users and profit centers, turning the metabolic rift into a biological and health reality paid for by the most marginalized peoples.

Green AI is Not Enough

Many companies talk about Green AI: more efficient models, chips with lower power consumption, data centers using renewable energy, and water or carbon offset programs. These steps are important, but they remain limited if they do not address the fundamental question: who owns the infrastructure, who decides its size and location, and who pays its environmental price?

Efficiency alone does not mean justice. Making a model cheaper and faster expands its usage to a degree that increases the total aggregate consumption of energy, water, and minerals. Furthermore, a data center running on renewable energy may still depend on minerals extracted in polluting conditions, chips manufactured with water- and chemical-intensive processes, or data collected without adequate consent.

The paradox intensifies when AI tools themselves are used to optimize fossil fuel extraction. Reports have pointed to the use of AI and high-performance computing to interpret seismic data and accelerate exploration and production decisions in the oil and gas sector. Here, "Green Intelligence" becomes double-edged: it may help monitor the climate on one hand, and help extract more fossil fuels on the other. Therefore, it is not enough to ask whether the algorithm is efficient; we must also ask: in the service of which economy does it operate?

In this sense, green discourse can become a form of greenwashing (Greenwashing) if it cleans the interface and leaves the extractive infrastructure intact. Sustainable AI is measured not just by the grams of carbon per computing operation, but by its capacity to respect the earth, water, labor, data, and communities that make it possible.

Toward Just and Democratic Governance

From a Marxist ecological perspective, AI governance is not merely better risk management, but an attempt to reorganize the material relationship between technology and nature. The question is not only how we reduce emissions, but how we democratically decide the scale of computing we need, where to build it, its energy sources, its water and mineral consumption limits, and who owns its value and fruits. In this sense, AI governance reclaims an old Marxist question: how can society rationally and collectively regulate its material exchange with nature, instead of leaving it to the blind power of the market?

In the context of AI, computing, water, energy, mineral, and data decisions should be subjected to democratic accountability that considers planetary boundaries and the rights of communities and future generations. Governance must become a binding system of accountability based on the following principles:

- First: AI companies must be mandated to disclose their full life-cycle footprint: mineral sources, water and energy consumption, emissions, chemicals, hardware lifespan, and e-waste. Partial carbon reports are insufficient, as they make the system appear cleaner than it actually is.
- Second: Data centers and their associated energy infrastructure must undergo a cumulative environmental justice review. Licensing should look at the history of the location: Does the area suffer from prior pollution? Is water scarce? Do residents already bear health or industrial burdens? And does the local community have a real capacity to consent or object?
- Third: Mineral supply chains must be subjected to strict environmental and human rights standards. There is no meaning to "green" artificial intelligence if it is built on polluting mining, unsafe labor, land dispossession, or the violation of indigenous peoples' rights to free, prior, and informed consent.
- Fourth: Water must become a central part of AI policy. Data centers or chip fabrication plants should not gain preferential access to scarce water without transparency, clear limits, drought plans, and actual participation from local communities.
- Fifth: Data sovereignty must be respected, especially in environmental projects that rely on local knowledge or data from marginalized communities. Environmental protection should not become a new door for extracting knowledge without consent, clear ownership, or mutual benefit.
- Sixth: Data labor, classification, and review must be recognized as real work rather than a technological shadow. Workers who review, classify, and clean data must be provided fair wages, psychological protection, the right to organize, and contract transparency.
- Seventh: AI hardware should be regulated according to circular economy principles: extending equipment lifespan, repairability, reuse, responsible recycling, and holding

producers responsible for the waste they create. The model does not end when the server stops working; it continues in the minerals, plastics, and toxins it leaves behind.

Finally, the question of ownership itself must be raised. If major models, computing, data, and cloud infrastructure remain in the hands of a few corporations, sustainability will remain subject to the logic of rent and expansion. Therefore, narrow technical solutions are not enough. We need strong public regulation, public-interest infrastructures, democratic data governance, and a genuine capacity for communities to accept or reject.

Conclusion: No Intelligence Without Accountability

From the mine to the model, AI reveals that the cloud is not outside nature, but built upon it. It requires minerals extracted from the earth, water to cool servers, energy to power data centers, and data collected from humans and communities. However, value is not distributed the way harms are. Some get intelligence, rent, and power, while others get pollution, water depletion, waste, and loss of control over their environments.

The environmental impact of AI is often a form of slow violence: a gradual depletion of water, energy, air, labor, and data, occurring far from the user who only sees the speed of response. Therefore, AI is not just or sustainable simply because it is more efficient. It becomes so only when its material and political infrastructure is held accountable: from the mine, to the chip, to the data center, to the model.

Environmental justice reveals who bears the harm. Marxist ecology uncovers the logic of extraction. Technofeudalism exposes the new form of power in the age of the cloud. As for the final ethical and political question, it is simple: do we want an artificial intelligence that reproduces sacrifice zones, or an intelligence that submits to the boundaries of the earth and the rights of its inhabitants? AI cannot be called intelligent if it is built on environmental sacrifice zones.

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