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Forest Governmentality and the Struggle for More-Than-Human Sovereignty

DID OUR CULTURE BEGIN WITH THE STRUGGLE AGAINST THE FOREST?

—JOACHIM RADKAU[1]

For centuries the forest has operated as a critical site of political struggle and environmental reform. Despite the dismantling of the planetary commons through regimes of property and extraction, forest practices have evolved into a complex ecology of social, financial, and political arrangements. This essay explores three legal instruments of forest governmentality—the Charter, the Constitution, and the Contract—that offer an updated imaginary for the rights of nature and more-than-human sovereignty beyond property.

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[1] Joachim Radkau, *Nature and Power: A Global History of the Environment* (Washington, DC: German Historical Institute, 2009), 136.



Carta de Foresta, with great seal, Westminster, February 11, 1225, Henry III, King of England. Courtesy of the British Library.

The Charter

In 1217, King Henry III issued the *Carta de Foresta* (Charter of the Forest) alongside the *Magna Carta*. While the *Magna Carta* defined the foundational rights of free English men, the Charter of the Forest reasserted the rights of commoners to use the royal forests. Commoners in medieval England had traditionally depended on the forests for survival, using them for grazing animals, farming, foraging, accessing water, and gathering wood for fuel and construction. Over the centuries, however, the Crown had systematically increased royal claims to land to regain territory and raise income for military campaigns, restricting commoners' access and usufructuary rights to the forest. Like the *Magna Carta*, the Charter of the Forest was issued in response to uprisings against these royal abuses of power and recognized the critical importance of forest resources to all people: from the royal court to landholders to peasant communities.[2] The Charter rolled back many of the royal restrictions: disafforesting tracts of land recently claimed by the Crown, restoring rights for commoners to sustainably use the forest resources, repealing harsh punishments for illegal uses, and establishing forest courts to oversee and enforce these laws. The document was critical in its establishment of the rights and protections of the commoners and their relationship to the forest ecosystem.[3] The common law established through legislation such as the Charter of the Forest served as a critical mediator between the sovereignty of the state, the economic rights of the commoners, and the health of the forest, becoming one of the first instances of environmental regulation and sustainable use of a natural resource.

Over the subsequent centuries, regional powers increasingly relied on forest resources not only for royal hunting grounds but also to supply fuel for burgeoning industries such as mining, metalworks, salt production, and brickyards. Instead of clear-cutting, these landholders cultivated and protected their crop by afforesting large monocultural tracts and legislating conservation methods to ensure future timber supplies and forest rejuvenation. As historian Joachim Radkau writes in *Nature and Power*, "A profound change occurred in the late Middle Ages: it was not forest clearance, but the forest itself that became the foundation of political power... Territorial lords manifested their claim to dominion in the forest no longer by clearing the forest, but by protecting it." [4] Competing interests over access to contested woodland resources sparked increasing conflicts between landholders (and their appointed forest wardens) and peasant communities that relied on the forest for daily survival. Against these pressures, peasant forest cooperatives participated in (and often won) both legal struggles through forest court systems and bloody uprisings against landholders. The forest thus operated as a critical site of political determination and negotiation for peasants. Despite these conflicts, Radkau writes, "for all the struggles over the forest, lords and peasants did have common interests, and until the sharp separation of agriculture and forestry in the nineteenth century, the radical expulsion of peasants was unthinkable." [5] It was the rise of industrial capitalism—and its totalizing system of private property—that resulted in the ultimate dismantling of peasant power.

The Enclosure movement of the eighteenth and nineteenth centuries—driven by accelerating industrialization and privatization—led

[2] Daniel Magraw and Natalie Thomure, "Carta de Foresta: The Charter of the Forest Turns 800," *Environmental Law Reporter* 47, no. 11 (2017): 10936.

[3] "The charter thus lays down a system of governance for the common stewardship of shared resources, specifically for the management of the commons by commoners and others for the preservation of the forests themselves." Magraw and Thomure, "Carta de Foresta," 10934–10940.

[4] Radkau, *Nature and Power*, 138.

[5] Radkau, *Nature and Power*, 142.

to the full-scale dismantling of communal land structures. This land theft, which primarily benefited large landholders, consolidated forest woodlands into private property and made access to the commons illegal. In an early essay from 1842, Karl Marx discusses the increasing criminalization of taking felled wood from privately owned forests in Prussia, arguing that the state transformed the peasant into an “enemy of wood.”[6] This antagonism, for Marx, was an indication of the greater deterioration of common rights. In *Marx’s Ecology*, John Bellamy Foster points to this moment as a turning point in Marx’s thinking about private property. “The poor were thus denied any relation to nature—even for their survival—unmediated by the institutions of private property,” Foster writes.[7] Capitalist relations to land rely on the private mediation of nature—and on a multitude of legal instruments and modes of enforcement that fuel ongoing patterns of dispossession, extraction, and environmental degradation. The Charter of the Forest can be seen as a counter to these processes of privatization and exploitation, and its ethos has served as a precedent in ongoing struggles to protect the rights to the commons. As legal theorists Daniel Magraw and Natalie Thomure write: “Indigenous and other local communities across the Americas invoke the ideas set forth in the Forest Charter and Magna Carta to protect the natural resources on which their livelihood and culture depend.”[8] However, while the Charter of the Forest may echo powerfully through the centuries, such legal instruments remain problematically positioned within legacies of colonial power that treat the commons and its people as resources to be exploited. Increasingly, scholars, theorists, and activists look to non-European relationships to the land to reimagine the legal instruments of environmental governance and protection. To such ends, the forest persists as a revolutionary site of political struggle and sovereignty, constituting a crucial ground for generating new forms of post-capitalist land relations today.

[6] Karl Marx, “Debates on the Law on Thefts of Wood,” in Karl Marx and Friedrich Engels, *Collected Works*, vol. 1 (New York: International Publishers, 1975), 224–263.

[7] John Bellamy Foster, *Marx’s Ecology: Materialism and Nature* (New York: Monthly Review Press, 2000), 67.

[8] Magraw and Thomure, “Carta de Foresta,” 10939.

The Constitution

Nearly 800 years after the Charter of the Forest, the nation of Ecuador held a referendum to rewrite the nation’s constitution. The approved 2008 constitution marked the first time that a nation formally acknowledged the legal standing of nature in its governing document. The “Rights of Nature” clause, as written in Chapter 7, Article 71, asserts:

NATURE, OR PACHAMAMA, WHERE LIFE IS REPRODUCED AND OCCURS, HAS THE RIGHT TO INTEGRAL RESPECT FOR ITS EXISTENCE AND THE MAINTENANCE AND REGENERATION OF ITS LIFE CYCLES, STRUCTURE, FUNCTIONS, AND EVOLUTIONARY PROCESSES. ALL PERSONS, COMMUNITIES, PEOPLES, AND NATIONS CAN CALL UPON PUBLIC AUTHORITIES TO ENFORCE THE RIGHTS OF NATURE.[9]

The “Rights of Nature” clause was the outcome of a decades-long activist struggle and legal mobilization against ongoing extraction and pollution by multinational and state-owned energy and mining corporations, including the

[9] Chapter 7: Rights of Nature, Ecuador’s 2008 Constitution, as translated in David R. Boyd, “Pachamama and Ecuador’s Pioneering Constitution,” *The Rights of Nature: A Legal Revolution That Could Save the World* (Toronto: ECW Press, 2017), 173.

Royal Dutch Shell Company, Texaco, Petroecuador, Repsol, and Argentina's Compañía General de Combustibles (CGC). Spearheaded by peasant and Indigenous groups—including the Confederation of Indigenous Nationalities of Ecuador (CONAIE), the Organization of Indigenous Peoples of Pastaza (OPIP), the Original Kichwa People of Sarayaku, and the NGO Acción Ecológica—the movement continues to fight the territorial encroachment and catastrophic contamination of forest ecosystems and Indigenous land, challenging the oil concession blocks granted to corporate entities by the state in Amazonia.[10] Replacing the Crown with state-endorsed corporations, these destructive practices perpetuate both the environmental and social violence of neocolonialism: polluting vast areas of river and forest ecosystems, negatively impacting the health and crops of forest dwellers, evicting local communities to create new development corridors, and dispossessing Indigenous people of their lands. For instance, in one of the most often cited cases, for nearly thirty years, from 1964 to 1992, the American oil company Texaco knowingly released billions of gallons of toxic waste and crude oil into Amazonian soils. The contamination event became known as “Amazon Chernobyl,”[11] devastating the Amazonian ecosystems that local and Indigenous communities relied on and causing widespread endemic disease.[12]

By turning to a variety of legal tools to regain their lands and hold their dispossessors accountable, Indigenous, peasant, and activist organizations have reoriented the state's own legal instruments to constitutionalize environmental protections. Although these legal tools have historically been the same instruments that have enabled the exploitation of Ecuador's resources through land concessions and corporate protection, these court battles open up new landscapes of jurisprudence, reframing both human–nature relations and the nonhuman legal standing of nature. The landmark case *Kichwa Indigenous People of Sarayaku v. Ecuador* claimed that throughout the 1990s, the state of Ecuador granted permits to the private oil company CGC to explore and begin extraction processes in the Sarayaku territory in Amazonia without their permission.[13] CGC's actions “prevented them from seeking means of subsistence and limited their rights to freedom of movement and to cultural expression.”[14] Critically, in the court proceedings of the 2011 Inter-American Court of Human Rights where the case was ultimately heard, Indigenous activist and Kichwa representative Patricia Gualinga invoked the intimate relationship between the *Kawsak Sacha*, or “living forest,” and the people who live there: “These beings are essential not just for the Sarayaku, but for the equilibrium of the Amazon, they are all interconnected and, therefore, the Sarayaku defends its living space so ardently.”[15] Ultimately, after a decades-long legal battle, the court ruled in favor of the Sarayaku, finding the state in violation of Sarayaku territorial sovereignty and their relations to the lands.

These cases, among many other protests, struggles, and acts of resistance, formed a crucial backdrop for the constitutional assembly that incorporated the “Rights of Nature” into the 2008 Ecuadorian constitution. [16] Critically, the foundational notion of the clause (directly mentioned in the preamble to the constitution) is the Indigenous concept of Sumak Kawsay, translated into Spanish as *Buen Vivir*, and in English as “good living” or “harmonious coexistence.”[17] According to Alberto Acosta, former president of Ecuador's Constitutional Assembly, Sumak Kawsay works in direct opposition

[10] For a history of ongoing struggles to protect the forests of Amazonia, see Ursula Biemann and Paulo Tavares, *Forest Law—Selva Jurídica* (East Lansing, MI: Eli and Edythe Broad Art Museum, 2014).

[11] Steven R. Donziger, “Rainforest Chernobyl: Litigating Indigenous Rights and the Environment in Latin America,” *Human Rights Brief* 11, no. 2 (2004).

[12] The case was initially filed in 1993 as *Aguinda v. Texaco* by thousands of people from these affected forest communities, but Texaco ferociously fought the lawsuit for ten years until it was refiled in 2003 and transferred from New York to the Superior Court of Justice of Nueva Loja (Lago Agrio), the region in Ecuador that contains the oil field and devastated region. In 2011, eighteen years after the initial lawsuit, the Lago Agrio court ruled against ChevronTexaco and ordered the company to pay a multibillion-dollar fine to the 30,000 people in the communities affected by the contamination. Despite this ostensible victory, Chevron continues to refuse to pay for the damage, and the struggle for restitution is ongoing today. See Lucien J. Dhooze, “Aguinda v. ChevronTexaco: Discretionary Grounds for the Non-Recognition of Foreign Judgments for Environmental Injury in the United States,” *Virginia Environmental Law Journal* 28, no. 2 (2010): 241–298.

[13] Amnesty International, *Amicus Curiae: Case of the Kichwa People of Sarayaku vs. Ecuador Submitted Before the Inter-American Court of Human Rights* (Amnesty International Publications, 2011).

[14] Inter-American Court of Human Rights, *Case of the Kichwa Indigenous People of Sarayaku v. Ecuador*, June 27, 2012, 4

[15] Inter-American Court of Human Rights, *Case of the Kichwa Indigenous People of Sarayaku v. Ecuador*, 38.

[16] For an overview of these cases, see Boyd, “Pachamama and Ecuador's Pioneering Constitution.”

[17] For an in-depth analysis of the term and concept, see Joe Quick and James T. Spartz, “On the Pursuit of Good Living in Highland Ecuador,” in *Latin American*

to capitalist and anthropocentric forms of property, extraction, and development.[18] According to the Sarayaku people, *Sumak Kawsay* is tied directly to the *Kawsak Sacha* (“living forest”). As described at COP21 in Paris in 2015:

KAWSAK SACHA, UNDERSTOOD AS SACRED TERRITORY, IS THE PRIMORDIAL FONT OF SUMAK KAWSAY (BUEN VIVIR, “GOOD LIVING”). NOT ONLY DOES IT PROVIDE A HOME FOR ALL OF ITS INHABITANTS, IT ALSO EMOTIONALLY, PSYCHOLOGICALLY, PHYSICALLY, AND SPIRITUALLY REVITALIZES THEM. IN THIS WAY IT REGENERATES THE INDIGENOUS PEOPLES WHO LIVE IN COMMUNITY WITH THESE SYLVAN SELVES.[19]

Although the “Rights of Nature” clause is often difficult to enforce, especially as natural resource extraction is critical to Ecuador’s economy, the clause has served as an important precedent in many legal battles, with lawyers and activists continuing to experiment with its possible applications.[20]

As the Charter of the Forest arose from the political struggle of peasant cooperatives fighting for rights to common forest lands in medieval Europe, the “Rights of Nature” clause emerged from this contested space of Amazonia. Operating as a juridical document and legal precedent, Ecuador’s “Rights of Nature” clause offers a critical substrate for rebuilding systems of planetary governance and care. By rendering the legal standing of nature defensible, the constitution not only questions the assumption of nature as a resource to be appropriated via the mechanisms of private property but also recognizes that human rights are fundamentally tied to ecosystemic and environmental health. As Ursula Biemann and Paulo Tavares articulate in *Forest Law—Selva Jurídica*, a project documenting the ongoing struggles to protect Amazonia, “Advocacy for the rights of ecosystems became less a relic of ‘archaic cultures’ than a project inserted into the future.”[21] Integrating worldviews such as the *Kawsak Sacha* and *Sumak Kawsay* into legal structures is a critical act of futurity. However, enshrining these cosmologies into constitutional frameworks is insufficient without a parallel change in our forms of life and more-than-human relations. Critically, the legal recognition that human existence depends on restructuring our relationship to nature not only opens up new applications of ecological sovereignty but also requires an expansion of our sociotechnical tools of conviviality and care.[22]

Research Review 53, no. 4 (2018): 757–769.

[18] Alberto Acosta and Mateo Martínez Abarca, “Buen Vivir: An Alternative Perspective from the Peoples of the Global South to the Crisis of Capitalist Modernity,” in *The Climate Crisis: South African and Global Democratic Eco-Socialist Alternatives*, ed. Vishwas Satgar (Johannesburg: Wits University Press, 2018), 133–134.

[19] “Kawsak Sacha –The Living Forest: An Indigenous Proposal for Confronting Climate Change,” presented by the Amazonian Kichwa People of Sarayaku at COP 21, Paris, November 30–December 11, 2015.

[20] In the first successful example, Norie Huddle and Richard Wheeler were granted a constitutional injunction against the provincial government of Loja in 2011 for beginning construction to widen the Vilcabamba-Quinara road in the south of Ecuador without an environmental impact assessment. The initial construction phases of the road caused the Vilcabamba River to increase its rate of flow and flood a sacred region of the valley and its residents. The court granted the constitutional injunction on the basis of Article 71 of Ecuador’s constitution, halting construction of the road and ordering the remedy of the environmental damage that had been inflicted on the river. For more, see María Valeria Berros, “Defending Rivers: Vilcabamba in the South of Ecuador,” in *RCC Perspectives*, no. 6, *CAN Nature Have Rights? Legal and Political Insights* (2017), 37–44.

[21] Biemann and Tavares, *Forest Law—Selva Jurídica*, 17–19.

[22] From Ivan Illich, *Tools for Conviviality* (New York: Harper and Row, 1973), 24: “I choose the term ‘conviviality’ to designate the opposite of industrial productivity. I intend it to mean autonomous and creative intercourse among persons, and the intercourse of persons with their environment; and this in contrast with the conditioned response of persons to the demands made upon them by others, and by a man-made environment.”



Forensic chemist taking soil samples in the oil contaminated zone around Lago Agrio in Northern Ecuador. Spread from Ursula Biemann and Paulo Tavares, *Forest Law—Selva Juridica* [East Lansing, MI: Eli and Edythe Broad Art Museum, 2014].

The Contract

Beyond providing critical legal protections for ecosystems and people, the “Rights of Nature” clause has inspired economic, technological, and political expressions for more-than-human sovereignty. As a case study that explicitly mobilizes the “Rights of Nature” clause, the speculative art project *terra0* proposes a protocol that enables a forest to own itself. Formulated in 2016 by Paul Seidler, Paul Kolling, and Max Hampshire as both a white paper and a series of ongoing exhibitions, *terra0* lays a possible groundwork for digital forestry practices through nonhuman forms of ownership. While contemporary practices of forestry utilize digital tools such as software and sensors to profitably manage lumber harvesting rates—geotagging inventories, classifying species,[23] and monitoring long-term growth—*terra0* deploys blockchain technologies and smart contracts to automate processes of forest maintenance and timber sales on behalf of the forest itself. At its core, the ongoing *terra0* project puts forward a conservation agenda for ecological resilience by allowing forests to act on their own behalf.[24]

And now a few simple definitions. A “blockchain” is an open-access digital ledger of transactions managed by a peer-to-peer network. In other words, it is a public database verified and cryptographically secured by participants rather than a state or financial institution. Hosted on a blockchain, a “smart contract” is transaction software that functions as a self-executing code of instructions, performing the obligations of an agreement. Smart contracts are distributed, decentralized, and independent of the legal frameworks of the state. Equally critical, through the use of automated digital platforms as intelligent co-mediators, smart contract technologies offer an alternative social, legal, and financial relationship between a resource and its associated human actors/caretakers/exploiters. Through a reworking of traditional contractual relations, proponents of blockchain technologies argue that they constitute a reorienting of the historical trajectories of ownership and property.

[23] For example, see Yifang Shi, Andrew K. Skidmore, Tiejun Wang, Stefanie Holzwarth, Uta Heiden, Nicole Pinnel, Xi Zhu, and Marco Heurich, “Tree Species Classification Using Plant Functional Traits from LiDAR and Hyperspectral Data,” *International Journal of Applied Earth Observation and Geoinformation* 73 (2018): 207–219.

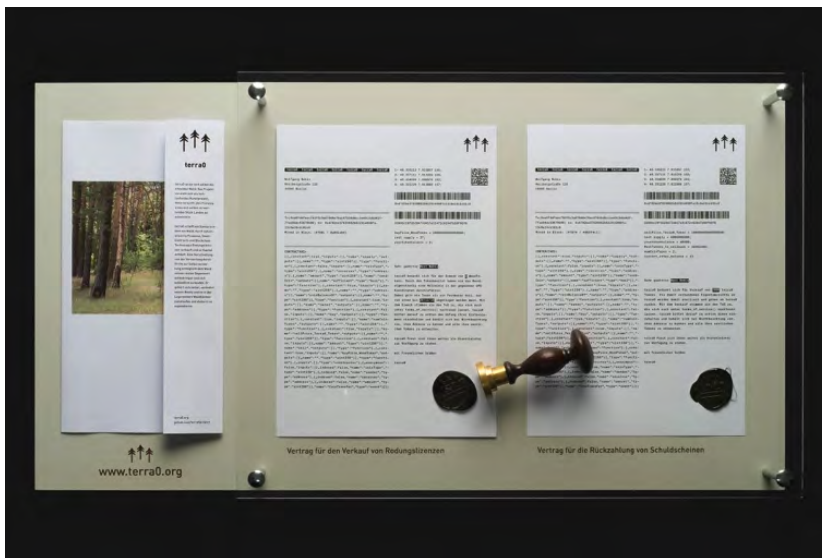
[24] *terra0*, “Abstract,” [link](#).

terra0 proposes an “augmented forest,” one that is established when human initiators purchase land and produce a smart contract between themselves and the forest, referred to as the nonhuman actor (NHA).[25] Because of the high costs of the initial forest purchase, human initiators would organize as a Decentralized Autonomous Organization (DAO), a member-owned and democratically governed entity that allows strangers to pool both financial resources and risk.[26] Although the NHA requires that the human initiators write the smart contract and also interface with legal systems to negotiate and secure the originary acquisition of land, the mechanism of the smart contract subsequently takes over the governance of the forest stock.[27] The smart contract enables the forest to operate as a peer to humans in the market, selling licenses to selectively log its own trees and buying back the tokens from the human initiators until the NHA eventually “owns itself.” Importantly, forests lend themselves to automated forms of monitoring, a hallmark of smart contracts. Individual trees in a forest are immobile and visible to aerial surveillance technologies like drones and satellite imagery, simplifying processes of “inventorizing” while minimizing overhead costs. According to the *terra0* authors, this compatibility enables the forest NHA to operate with financial autonomy, practicing self-governance (in this case of timber harvesting and sales) through inventory surveillance, mapping analysis, and smart contract automation. The blockchain instructions are encoded (by the initiators) to allow the forest as a legal entity to sell this timber stock in exchange for cryptocurrency, calibrating harvesting rates with timber value in order to maximize profits through sustainable logging yields. According to the artists, as the NHA achieves economic autonomy, the smart contract authorizes it to purchase land and expand its territory.

[25] Paul Seidler, Paul Kolling, and Max Hampshire, *terra0: Can an Augmented Forest Own and Utilise Itself?* (Berlin, 2016). *terra0* was first published as a white paper by the artists in 2016 and has since been exhibited at the 17th Architecture Venice Biennale, Ars Electronica, Biennale de Lyon, Drugo More, Furtherfield Gallery, Schinkel Pavillon, transmediale, and Vienna Biennale, among others.

[26] For more information on DOAs, see “Decentralized Autonomous Organizations (DOAs),” Ethereum, [link](#).

[27] See Adam Greenfield, *Radical Technologies: The Design of Everyday Life* (New York: Verso, 2017), 150: “A smart contract not merely records the terms of an agreement between parties in an autonomous chunk of code, but enacts it as well.”



Smart contract for forest resource management. © *terra0*, <https://terra0.org>.

The smart contract offers digital and economic forms of ecological sovereignty, expanding the agency of the NHA and serving as a critical infrastructure for environmental personhood. As articulated by the artists, “Blockchain technology and smart contracts enable nonhuman actors to

administer capital and therefore to claim the right to property for the first time.”[28] Expanding upon this nonhuman agency, Adam Greenfield writes in *Radical Technologies: The Design of Everyday Life*:

[28] Seidler, Kolling, and Hampshire, *terra0*.

ADHERENTS [OF BLOCKCHAIN TECHNOLOGY] SAW IN THE SMART CONTRACT THE FOUNDATION OF A TRANSHUMAN ECONOMY IN WHICH PEOPLE, MACHINES, ORGANIZATIONS, AND OTHER ENTITIES COULD ENTER INTO AGREEMENTS AS OR MORE BINDING THAN ANY EVER VALIDATED BY A BODY OF LAW.[29]

[29] Greenfield, *Radical Technologies*, 150–151.

Critically, despite the promise of this transhuman economy, *terra0* never actually moves beyond the ideology of property. The project still privileges the extractive logics of capital, albeit for a new type of stakeholder. The algorithms that drive *terra0* largely do so according to the logics of finance capital, replicating profit-driven market practices of timber extraction:

THE CONTRACT CAN SCRAPE DATABASES IN ORDER TO DYNAMICALLY REGULATE ITS PRICES... THE CONTRACT CAN OPTIMISE ITSELF FROM CYCLE TO CYCLE. THE CONTRACT THUS RECOGNISES WHICH TREES ARE MOST PROFITABLE, AND THEREFORE ONLY SELL, OR GROW, SPECIFIC TYPES OF TREES IN ORDER TO MAXIMISE PROFIT.[30]

[30] Seidler, Kolling, and Hampshire, *terra0*.

Because of these priorities engrained in the software, *terra0* sidelines critical ecological factors and risks simply reproducing capitalist-colonial dynamics. [31] The project assumes that survival in an extraction-based economy can only be achieved through selling “Woodtokens” in exchange for cryptocurrency to gain autonomy from dominant market forms. Since the blockchain is explicitly tied to volatile cryptocurrency markets, the assumption that the most rational artificial intelligence will be optimized for sustainable harvesting levels rather than a competitive market is inherently risky for the forest. For example, while the *terra0* smart contract contains internal mechanisms to prevent “overly-diminishing the tree population,” skyrocketing timber prices may incentivize the AI to prioritize territorial expansion over ecosystemic health, leading to the overharvesting of the forest based on the assumption that the net expansion of the forest fulfills the logic of the smart contract. Rather than operating under the assumption that an agential forest’s primary action would be to harvest itself, could the smart contract instead expand the agency of the forest beyond self-extraction? What other actions would—or *could*—a forest take?

[31] Seidler, Kolling, and Hampshire, *terra0*.

While *terra0* acknowledges the critical importance of forest ecologies, stating that the forest “produces not only wood, but serves as a protected space within which diverse species can survive, contributing to an overall ecological balance,” the smart contract must also link ecosystemic health with the needs and well-being of forest communities.[32] A smart contract written with the ethos of *Sumak Kawsay* could support alternative agencies for the “living forest” and its guardians. Since the augmented forest bears witness to human activity and habitat changes, the smart contract could react in real time to environmental triggers to ensure forest health. Additionally, allies of the

[32] Seidler, Kolling, and Hampshire, *terra0*.

forest could harness its open-access inventories and analysis algorithms to react in real time to destructive extraction, illegal logging, land treaty violations, and unmonitored pollution in an ecosystem—mobilized for agendas of long-term forest protection and maintenance.



Prototype for a self-owned forest. © terra0, <https://terra0.org>.

The Caretaker

What would it mean for a smart contract to speculate beyond the market, beyond ownership, beyond property? Although the *terra0* project expands the economic autonomy of the NHA, the self-owned forest still remains a common resource to be extracted, albeit for itself. How can we problematize this false choice between “being” and “being resource?” Thinking through Marisol de la Cadena’s concept of the *Uncommons*, these platforms could enable “assemblages of life where nature and humans might be beyond the either/or distinction.”[33] As opposed to framing the forest as “an economic unit in a post-human future,” the smart contract should instead be conceptualized as a medium of relations between divergent allies.[34] Learning from projects such as the Indigenous Protocol and Artificial Intelligence (IP AI) Working Group, which seeks to reposition artificial intelligence and algorithmic systems through Indigenous cosmologies and perspectives, is a critical step for implementing these smart contract protocols and potentials. The group poses the question: “How do we imagine a future with AI that contributes to the flourishing of all humans and non-humans?”[35] Directly addressing AI applications in ecosystemic monitoring in the 2020 IP AI position paper, Scott Benesiinaabandan writes:

OTHER AREAS WHERE THE NEAR-FUTURE AI COULD BE EMPLOYED IS IN INDIGENOUS LAND/WATER-USE AND SOVEREIGNTY PROTECTION. ONGOING ANALYSIS OF LAND/WATER-USE MAPS COULD PROVIDE DEEPER UNDERSTANDING OF TERRITORIAL USES AND IMPORTANTLY HOW BEST TO PROTECT

[33] Marisol de la Cadena, “Uncommons,” *Theorizing the Contemporary*, *Fieldsights*, March 29, 2018, [link](#).

[34] Seidler, Kolling, and Hampshire, *terra0*.

[35] Indigenous Protocol and Artificial Intelligence Working Group, “About,” *Indigenous AI*, [link](#).

ON-THE-LAND RESOURCES, SUCH AS FISH STOCKS, FORESTS AND FOREST MANAGEMENT, ENDANGERED WILDLIFE POPULATIONS, CRITICAL WATERSHEDS AND HIGH RISK HABITATIONS. WHILE DRONE-AI IS A SCARY PROPOSITION, AS IT IS MOSTLY DRIVEN BY THE MILITARY AND COMMERCIAL INTERESTS, THE SAME DEEP LEARNING PROGRAMS, COUPLED WITH THE AUTOMATION AERIAL SURVEILLANCE OF DRONE MONITORING OF INDIGENOUS TERRITORIES COULD BE USED AS A POWERFUL TOOL FOR INDIGENOUS SOVEREIGNTY ACTIONS.[36]

Beyond incorporating established Indigenous forest management practices into a smart contract algorithm, how can these technologies, contracts, and legal frameworks support and enable new forms of resistance, conservation, and rematriation? Through an expansion of forms of non-human self-ownership, AI platforms constitute a potential rupture in the historical trajectories of resource management: expanding social interfaces, challenging territorial borders, and redesigning the tactics of ecological care.[37]

While the smart contract constitutes a new type of charter—distributed, decentralized, and independent of existing legal frameworks of private property—it is not inherently a *social* contract. As digital culture scholar Rachel O’Dwyer writes, blockchain technology does not represent radical politics in its own right, but instead “allows cooperation without trust, in other words—something that is quite different from fostering or building trust.”[38] For a smart contract to be reoriented toward the social, members must expand the collective agreement beyond merely financial arrangements. Because all functionality is automated through the AI of the smart contract, *terra0* as it currently stands bypasses many participatory forms of consensus-building with human caretakers, instead simply outsourcing tasks to third parties based on an internal analysis of forest health and timber value. These platforms and tools of forest governmentality—and the associated forms of digital sovereignty and stewardship that they offer—could radically retool modes of direct participation through data sensing and enable new practices of care for the forest. “How do forests, ‘citizens,’ more-than-humans, and sensor technologies converge to invent new forms of politics that are attentive to present matters of concern and those that are yet to come?” asks sociologist and media theorist Jennifer Gabrys in her book *Program Earth*.[39] This question opens up important implications for each case study and their embedded environmental agendas. If the Charter, the Constitution, and the Contract are leveraged to expand the rights of the forest and its communities, could they not also be used to more radically overturn the extractive logics of property toward a politics of care?

[36] Scott Benesiinaabandan, “What Does the Future Look Like for AI? Oshkaabewis or a Skynet,” in *Indigenous Protocol and Artificial Intelligence Position Paper*, ed. Jason Edward Lewis (Montreal: Initiative for Indigenous Futures and the Canadian Institute for Advanced Research, 2020), 128–129.

[37] For more examples of projects investigating modes of ecological resilience enabled through AI and blockchain technologies, see the Sovereign Nature Initiative at [link](#).

[38] Rachel O’Dwyer, “Blockchains and Their Pitfalls,” in *Ours to Hack and Own: The Rise of Platform Cooperativism, A New Vision for the Future of Work and a Fairer Internet*, ed. Trebor Scholz and Nathan Schneider (New York: OR Books, 2016), 230.

[39] Jennifer Gabrys, *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet* (Minneapolis: University of Minnesota Press, 2016), 54. For more resources, see Jennifer Gabrys’s citizen-sensing platform, [link](#).



An array of sensors at James Reserve measuring moisture and respiration of CO₂ throughout the soil. Photograph by Jennifer Gabrys, 2008.

Without problematizing the mechanisms of ownership itself, the political imaginaries of these forest practices stay limited to the logics of capital. The fundamental question remains: if Nature has rights, what is the future of ownership? Beyond granting nonhuman actors the ability to own and manage property, these legal mechanisms and platforms could be used to cultivate a more intimate framework of co-dependencies between ecological systems, their human stewards, and the governmental frameworks they rely on.

In the same way that the forest lends itself to automated governance protocols due to its large scale and long-term growth cycles, emerging sensor technologies have greatly expanded the ability to monitor, image, and sense these ecosystems, initiating a new “forest awareness.”^[40] These increasingly accessible tools—cheap sensors and free apps mobilizing smartphone users—can continue to animate forest fieldwork practices with an activist and political imaginary. Broadening the open-access and open-source ledger of transactions characteristic of the smart contract, other publics could share data through crowdsourced research initiatives, environmental activist groups, and citizen scientist workshops. Just as in the ongoing struggles against ChevronTexaco in the Ecuadorian Amazon, tactics of data collection, mapping, and analysis are critical methods for ground-up practices of ecopolitical power. In *Forest Law*, Biemann and Tavares recount how prosecutors instrumentalized techniques of gathering geolocated data on soil and water toxicity from hundreds of sites as proof of the ecological catastrophe: “The forest was momentarily converted into a juridical court and vast technical laboratory.”^[41]

A forest that senses also attends, attests, and witnesses, carefully gathering evidence for political action through remote and distributed sensory networks. As digital humanities scholar Jonathan Gray writes, the datafication of forests aims to “gather not only data or input for scientists or policy-makers, but also for data witnessing collectives which are capable of articulating care, concern and solidarity for and with their fellow travelers.”^[42] By thinking of the “living forest” not only as an ecosystem but also as a laboratory, full of sensors collecting data for future testimonials and stories, the implications of ecological personhood expand into social relations. Beyond forensics, the

[40] A term used by Joachim Radkau in Radkau, *Nature and Power*, 141.

[41] Biemann and Tavares, *Forest Law—Selva Jurídica*, 58.

[42] Jonathan Gray, “The Datafication of Forests? From the Wood Wide Web to the Internet of Trees,” in *Critical Zones: The Science and Politics of Landing on Earth*, ed. Bruno Latour and Peter Weibel (Cambridge,

sensors act as intermediators, translating not only the atmospheric and material conditions of the forest but also the needs and desires of the ecosystem for human interpretation. As Gabrys writes, “Environmental monitoring through sensor networks is a technoscientific practice that pertains not just to the study of ecological relations but also to newer modes of participatory sensing and citizen-science activity.”[43] Alongside fieldwork and evidence gathering, these relations among environmental advocates, automated digital platforms with self-sensed data, and a sensing forest make possible alternative forms of kinship, entanglement, and conviviality between a forest and its caretakers.

These case studies offer critical insights for forest governmentality today—from redefining our relationship to natural resources and ecosystem services,[44] to expanding forms of forest governance and legal sovereignty to nonhuman entities and environments. While the Charter of the Forest recognized the rights of the commoners to use the land, the 2008 Ecuadorian constitution expanded to recognize the right to a good life for both nature and its communities. The *terraO* projects adds to this tool set, developing a contract platform that imparts self-governance and legal sovereignty to the land itself. These diverse mechanisms of governmentality, supplemented by smart forest technologies and open-access data sets, not only prompt us to reconsider territorial agency and its instruments but also offer more accessible tools for collective action on climate change. While these technologies and legal tools do not offer salvation for the accelerating environmental crisis, they do propose possible platforms for ground-up governmentality by rerouting the relationship between property, capital, and personhood. Attempting to pursue a more radical politics to challenge the violence of extraction, these protocols of land self-ownership represent possible insights into processes of land rematriation, conservation, and resilience. A future landscape of self-owned forests could produce novel spatial expressions: citizen scientist field stations networking and sensing patchy landscapes, activist climate camps protecting tracts of autonomous woodlands, and forest cooperatives embedded in local communities. Learning from this diversity of spatial practices and governing platforms could begin to support more paths to “good living.” Tended by human caretakers, legal advocates, and self-generating software, these landscapes offer a more participatory, scalable, and replicable set of tools that capture the revolutionary politics required to care for crucial forest ecosystems today.

MA: MIT Press, 2020), 371.

[43] Gabrys, *Program Earth*, 54.

[44] For more on the use of smart contracts for assisting with programs for Payments for Ecosystem Services (PES) in the context of Community-Based Natural Resource Management (CBNRM), see Daniel Oberhauser, “Blockchain for Environmental Governance: Can Smart Contracts Reinforce Payments for Ecosystem Services in Namibia?” *Frontiers of Blockchain* (November 2019), [link](#).