FEATURETTE:

Blockchain Ecologies: Ownership Beyond Extraction

by Brittany Utting and Daniel Jacobs

> The hum of an approaching drone initiates a soft chirp from the digital tree tag. The forester scans the tag for Tree #4475, scrolling through the data to verify its trunk diameter with the AI's open request. The tree width is accurate, but a bloom of fungal caps around the trunk base gives the worker pause. The forester inputs the presence of the rhizome into the software interface and waits for the smart contract's harvesting protocol to adjust ...

How can smart contracts and blockchain technologies change traditional models of resource ownership and extraction, such as the harvesting of Tree #4475? While typical resource contracts create legal agreements among people, corporations, and state actors, the smart contract offers an alternative framework for ownership: one in which a nonhuman resource (such as a forest) can own and manage itself.

Hosted on a blockchain, a smart contract is a form of digital transaction software that functions as a self-executing code of instructions, performing the obligations of a legal agreement.[1] Operating automatically and independently of enforcement authorities such as the state, the smart contract can interface between entities excluded from typical definitions of personhood, offering nonhuman resources a mechanism to participate in institutions of property.[2] Through the inclusion of nonhuman actors in the contractual agreement—on ecological personhood and territorial sovereignty—these blockchain technologies prompt us to reconsider how we extract, source, and specify the materials of the built environment.

The ongoing art project *terra0* lays a possible groundwork for a digital praxis of resource autonomy and ecological self-governance. Formulated by Paul Seidler, Paul Kolling, and Max Hampshire in 2016, *terra0* is a digital platform that enables a forest to own itself. In the *terra0* model, human agents purchase a tract of land and initiate a smart contract with the forest nonhuman actor (NHA). While the NHA requires a human initiator to secure the original acquisition of land, the mechanism

Smart contract for forest resource management. From Paul Seidler, Paul Kolling, Max Hampshire, *terra0,* 2016. Photo © terra0.

of the smart contract subsequently takes over the governance of the forest. Built on the Ethereum network, the smart contract's artificial intelligence enables the forest to license the incremental sale of its own timber until the forest can buy itself back from the human initiators, allowing the NHA to eventually control its own capital.[3] Coded with automated protocols to manage the forest inventory, and using drones and satellite imagery to calibrate lumber harvesting frequency with timber sales, the forest can maximize its profit and expand its territory as the NHA achieves economic independence.

Critically, *terra0*'s algorithms largely operate through market logics of finance capital, risking the replication of profit-driven practices of timber extraction. While the negative impacts of overharvesting are certainly considered in the *terra0* white paper, the smart contract could be more explicitly calibrated to optimize ecosystemic needs such as forest health, tree life cycles, and biodiversity. Moreover, while blockchain-based technologies allow for nonhuman autonomy, the smart contract is not inherently a durable social contract unless initiators expand the collective agreement beyond financial arrangements. Instead, the smart contract could be conceptualized as a network of relations that includes systems of non-monetary barter, usufruct, and labor exchange between nonhuman resources and human allies, establishing mutually beneficial forms of stewardship, advocacy, and care.

It is not a leap to imagine that such an adjustment could radically alter the material practices of architecture, binding building construction to larger political, territorial, and ecological agendas. Broadening the limitations of sustainable certifications, an NHA-informed ethos of material sourcing could give rise to a less extractive supply chain framework. For instance, architects, developers, contractors, and material suppliers could begin to specify products sourced from nonhuman entities tracked by digital ledgers, making the carbon footprint, lifecycle, and sourcing of building materials more visible. These platforms would constitute a radical reappraisal of the materiality of the built environment, explicitly embedding practices of sustainable harvesting, carbon sequestration, and land stewardship into building codes, product specifications, and construction standards.

The increasing datafication of forests and emerging use of digital protocols for resource self-ownership offer critical insights into processes of land rematriation, conservation, and environmental resilience.[4] These speculative models could potentially transform the relationship between material resources and their conditions of extraction into a more intimate human and nonhuman co-dependency. Beyond extraction, a future landscape of self-owned and self-sensing forests—quietly tended by human caretakers and automated softwares—would engender a more entangled web of material sources: a living inventory and lively supply chain participating in new practices of planetary care.

> ... A notification pings the forester's screen, instructing her to continue to Tree #4682. As she passes through the undergrowth, its mycorrhizal network sends a chemical signal. The drone continues overhead, scanning the canopy for a response.

1 A blockchain is an open-access digital ledger of transactions managed by a peer-to-peer network. The blockchain constitutes a public database of all transactions, verified and cryptographically secured by participants rather than a state or financial institution.

2 While critical of many current blockchain platforms, Adam Greenfield writes that "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 as any ever validated by a body of law." Adam Greenfield, *Radical Technologies: The Design of Everyday Life* (New York: Verso, 2017), 150–151.

3 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." Paul Seidler, Paul Kolling, and Max Hampshire, 2016, "*terra0*: Can an Augmented Forest Own and Utilise Itself?" 2. https://terra0.org/assets/pdf/terra0_white_paper_2016.pdf.

4 For more possibilities on the applications of digital technologies in the management and conservation of ecologies, see the SmartForests project led by Professor Jennifer Gabrys at https://smartforests.net/.