



The Tech Ecosystem and the Colony

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In light of the recent release of *Can't Get You Out of My Head*, Adam Curtis's *The Use and Abuse of Vegetational Concepts* bears re-examination. Curtis's 2011 appropriation essay film visits English botanist Arthur Tansley's influential, similarly titled article to appraise how the metaphor of the self-regulating ecosystem came to prominence in networked society. The film articulates a history of the present, first showing how theoretical ideas about nature's capacity to maintain equilibrium between biotic and abiotic factors—like how a stable lake ecosystem depends on diverse biological populations of producers, consumers, as well as regular concentrations of oxygen and exposure to sunlight—relied on thinking about balance as something achieved and maintained by the networked relations between entities composing the system itself. Next, Curtis traces how the idea of self-regulating systems made its way into the digital cultures of societies networked by personal computers, where political power could emerge as a decentralized force from collectives of individuals acting together, linked as though within a self-regulating, and therefore self-organizing, system.

Curtis's title references the conflict that Tansley saw between his own scientific theory of nature—the ecosystem—and the idea of holism propounded by Jan Smuts, the South African political leader, general, ecologist, and one of the philosophical architects of apartheid. Curtis's film gathers together sources, like Fred Turner (2006) and Peder Anker (2009), recording the intellectual history of how the idea of self-organization through connectivity drew from ideas about how nature worked and became an ideology driving the social movements of the 20th and 21st centuries, but Smuts's contribution to this media genealogy remains opaque.

Given the methodological turn in media studies toward thinking about environmental elements and materiality as informational communication bridging human and

nonhuman worlds (Peters), Curtis's film reminds media scholars that environmental concepts have specific histories and social contexts that have been both used and abused. In various places and times, environments have been conceived as media technologies and vice versa. Foregrounding the *historicization* of media environments, as Yuriko Furuhashi argues, assists accounting for *how* mediatized conceptualizations of the environment are political and not "an ahistorical given" (72). Likewise, as Florian Sprenger writes, environmental conceptions and terms are *not equivalent*; there are "many different concepts" for designating "the historical epistemology of surroundings: *milieu*, *Umwelt*, *environment*, [...] each raised their own questions about the relationship between the external surroundings and the internal surrounded" (9). In this short essay, I want to sketch a brief genealogy of the term *ecosystem* with recourse to the tactics of postcolonial computing studies to draw the term's eugenic assumptions into sharper relief. In re-examining the ecosystem beyond the ideology of self-organization, I trace and emphasize how Smuts's idea of holism—and the racially segregated organizational structure it implies—has stayed the course alongside the history of the term.

In a contemporary context, the ecosystem has a novel and mediated valence. [Media ecosystem](#), [digital ecosystem](#), [tech ecosystem](#), [platform ecosystem](#), [startup ecosystem](#): what does this phrasing actually mean? [I've written elsewhere](#) about how the history and political economy of ecosystemic thinking can help critique the relationship between media, disaster capitalism, and the militarization of environmentalism. But how is the ecosystem an *organizational* term of media?

Perhaps no word describes the techno-ecological imagination of sustainability better than "ecosystem." Tansley originally described the "ecosystem" as a natural tendency toward energetic equilibrium in a setting like a pond, drawing this approach from thermodynamic theories that detailed the behavior of technical devices like heat pumps. For Tansley, energy flow generally dispersed in ecosystems as plants (producers) collected sunlight and circulated that energy into the broader material environment through consumption by other organisms. His theory accounted for interactions between biotic and abiotic components, as in the energy exchanges connecting inorganic compounds like soil, oxygen, and solar energy to the behavior of organisms. In sum, these idealized and model "systems" were inclined to reach an equilibrium state of energetic dissipation. Importantly, Tansley made room for considering the role of human action in these systems. Ecosystems could be anthropogenic. But why does the ecosystem, a concept drawn from a biological typology, find purchase in the description of recent media landscapes?

Donna Haraway identified the ecosystem as a metaphor consistent with cyborg hybridity, as ecosystems assume epistemological unity between technological and natural form, although she cautions that the concept falls on the side of "informatics of

domination” (161). As much is apparent in looking to the language of Michael Rothschild’s 1990 book *Bionomics: Economy As Ecosystem*, a foundational text for informational capitalism, which helps shed light on how the ecosystem concept became a dominant metaphor in the Silicon Valley valorization of digital economies. “According to the bionomic view,” Rothschild argued, “genetic information and technical information independently evolved into an ecosystem of striking similarity because both realms of information confronted problems of survival in environments with limited resources” (349). From this view, ecology and the free market were conceived as corresponding sub-systems within the overarching logic of digital information, a cybernetic abstraction that created an allegedly universal language permitting an ideology that linked networked personal computing, economic libertarianism, and Darwinist competition in the same whole system. The ideals of tech ecosystems—that information communication technologies can lift networked individuals into better standing without the governmental institutions of a bureaucratic society—is the topic of Turner’s salient critique, which he terms “the politics of holistic consciousness” (2010).

Turner’s research has been central to describing how intellectual exchanges in the U.S. during the 1960s-70s between cyberneticists, counter-culturalists, computer engineers, entrepreneurs, and the burgeoning new environmental movement help explain the techno-libertarian ideologies that drive Silicon Valley’s utopian capitalist vision. Turner writes that “the politics of holistic consciousness circa 1968” indicate a historical moment when the circulation of material book-form catalogs, [notably the *Whole Earth Catalog*] (<https://monoskop.org/log/?p=2036>), were conceived as networked information technologies boasting “access to tools” and promising individual readers knowledge that would benefit each individual’s sustainable integration into larger-order and whole socio-environmental systems:

In the late 1960s, before the Internet was publicly available, the Whole Earth Catalog served as a map of tools for the transformation of consciousness [...]. [T]he Catalog’s readers provided each other not only with access to tools, but with themselves, as tools, for turning themselves into networked individuals aware of the social, technological, and natural systems within which they lived. (45)

Knowledge, information, and consciousness were conflated in the same cybernetically-modelled ideology that privileged local self-sufficiency as treatment of the whole system, a worldview that aligned with the spiritualism of the counterculture and inspired the communes that formed in the back-to-the-land movement.

For Turner, these “New Communalists” believed social self-organization and self-sufficiency followed from access to the right knowledge aggregated and curated through networked informational media like the *Whole Earth Catalog*. They valorized the

mechanisms of whole systems above traditional forms of political structure and organizing. In the American context of this techno-ecological holism, the communes privileged access to knowledge for building environmentally friendly technology that enabled sustainable living off the land, while neglecting the material conditions of difference and inequality that characterized their social life.

The communes were incongruous because they reproduced the extant American norms of social discrimination despite their egalitarian techno-utopian ideals. Created primarily by college educated upper middle-class white members, the New Communalists instituted gendered divisions of labor, from which their self-organizing techno-ecological systems had promised an escape. Also, Turner notes that “[e]xplicit racism was not welcome anywhere in the New Communalist world, but implicit racism suffused it” (Ibid. 46). This attitude reflects a broader cultural shift during the Civil Rights era “from overt to more covert modes of racism and racial representation” that contextualizes what Tara McPherson calls the “lenticular logic” running through both the development of mid-century operating systems and U.S. culture. Their communes weren’t located just anywhere in emptied and unused space, either, as “they often built their almost exclusively white settlements near comparatively impoverished communities of color” (Turner, 46). In short, “[b]y imagining each other as elements in a whole system, the New Communalists focused not on engaging and accommodating differences, but on erasing them” (Ibid. 46). In the words spoken by a long-time Mexican-American Taos resident to several white commune visitors: “You see the scenery. We see a battle ground” (qtd. Ibid. 46).

But the escapism that defines this manner of settler-colonialism—“sustainable” living enabled by holistically connected information technologies—has a precedent in the history of the ecosystem. Holism is not an idea original to the New Communalists, Stewart Brand, nor the *Whole Earth Catalog*, but Jan Smuts. The philology that follows demonstrates how holism can indicate the segregated character of social organization, which may be the critical definition required for considering how tech ecosystems exacerbate standing radical inequality and neglect the material destruction of the environment that premises the digital economy.

In Anker’s account of *Imperial Ecology*, British colonial ecological science featured prominently in the racialized statecraft of early twentieth century South Africa. Smuts first coined and developed the philosophy of holism in 1910. At the time Smuts was working in the service of the British Crown to unite the Cape, Natal, Transvaal, and Orange Free State colonies into the independent Union of South Africa, and Anker argues that Smuts’s theory of holism developed as a reflection of his political maneuvers to bring the white British and Afrikaner colonial settlements together. Smuts was fascinated by the ecological study of nature, which he perceived as an integrated

and vital whole. Humans had transformative roles as agents in his holist ecological conception, but they were by no means exclusive actors in how nature worked. Smuts's vision of holistic nature was teleological: it was a system evolving from a primitive state to a more complex and differentiated one.

Anker shows how Smuts's idea grew out of his racist attitudes. Smuts saw Black people as less evolved than Europeans, and rationalized that Black Africans were located at a lower hierarchical status of the holistic order of nature than whites. In Anker's view, Smuts worked to distribute these philosophical ideas in the study of ecology, especially through the influence of his followers, the ecologists John Phillips and John William Bews. As Anker writes, it was later in the 1930s that "[t]hrough his politics of holism Smuts tried to create a multicultural country 'with human races ranging from the very lowest to the highest' with a political system that provided rights to each citizen according the level of their personality's state of being" (Smuts qtd. in Anker 177).

Smuts's racist politics of holism were based on what he conceived to be respect for the vernacular customs of different social communities, which advocated "allowing them to evolve separately through a political system of segregation" (Ibid. 192). One of his mentees, the ecologist John Phillips, established the idea of "biotic communities" based on this idea, chiefly in order to "designate the ecocentric ethics and environmental social policy of segregated ecological homelands" (Ibid. 192). The other, Bews, was a human ecologist who wrote a book named after the practice in 1935. In applying ecological concepts to human populations as an *organizational technique*, Smuts thought it was important to "protect the integrity of biotic communities, the right to evolve within them, and to exercise self-governance over local virtues" (Ibid. 192). Anker writes that one of Smuts's most famous quotes, "the whole is more than the sum of its parts," captures this segregated but communitarian holistic spirit: "a person separated from the local biotic community could not and would not as an individual evolve in the direction of social progress" (Ibid. 192). In this way, Smuts conceived himself an advocate of liberalism and social progression, albeit through the holistic organization of striated levels that afforded communities "with different biotic backgrounds" the ability to pursue "Freedom," which "to Smuts meant the right to evolve and progress from one whole into a higher whole" (Ibid. 192). Reduced to an operating logic, Smuts's holism is apparent in the imagined ideals of the nation's high modernist apartheid migrant labor system, an ideological abstraction which did not mask the brutal reality and violence of a racist police state.

Smuts wrote the 1926 book *Holism and Evolution* that sought to establish holism in ecological science by synthesizing the philosophy of Alfred North Whitehead with the evolutionary theory of Charles Darwin. In the book, Smuts maintained that the universe teleologically progressed toward increasingly differentiated and complex wholes: "the

creation of wholes, and ever more highly organised wholes, and of wholeness generally as characteristic of existence, is an inherent character of the universe” (Smuts 99). While Anker documents how Arthur Tansley’s notion of the ecosystem won out as a concept in the science, Frank Zelko remarks that Smuts’s ideas were kept alive both through the academic work of his protégés and through American advocates like Frederic Clements, who helped install “holistic language and sensibility” in environmental activist communities, “particularly those who embraced the sensibility of the 1960s counterculture” (Zelko 526). John Bellamy Foster and Brett Clark argue *Holism and Evolution* had a short-term and direct influence on debates in ecological science but longer-term impacts on both ecology and environmentalism in less immediate ways. Foster and Clark trace Smuts’s holism to Arne Naess’s “Deep Ecology” movement, influential to environmental ethics, which “carried forward many of the essentialist, vitalistic, and organismic traditions of the idealist side of the ecological debate” (342). Derek Woods discusses how Smuts’s ideas can likewise be seen in ground-breaking academic books like Carolyn Merchant’s 1980 eco-feminist text *The Death of Nature: Women, Ecology, and the Scientific Revolution* (290). Here, Merchant cites Smuts’s holistic ideas as foundational to modern ecology: “Ecology necessarily must consider the complexities and the totality. It cannot isolate the parts into simplified systems that can be studied in a laboratory because such isolation distorts the whole” (279). Citing Smuts does not determine the immense value of Merchant’s argument about gender in the historiography of science, but this instance does illustrate how pervasively and innocuously Smuts’s definition of holism persists

Of concern, in my view, is whether holistic ecosystems, in histories and contexts other than South Africa, carry with them hints of the eugenicist organizational structure that consisted of isolated and striated systems that inform and maintain the complexity of the whole. In the life of the idea, the application of holism encouraged organized negligence through escapism, as focusing on the situation of an isolated system or a single “biotic community” misses what is most valued: the action of the whole at the expense of the marginal.

Foster, Clark, and Richard York remind us that Smuts also coined the term apartheid—or apartness—in 1917 (315). In his strong advocacy of the territorial segregation of “the races” into what he called “a grand [white] racial aristocracy,” they argue that Smuts and his ecological holism contributed to the preconditions of South Africa’s state sanctioned system of racial segregation that brutally produced and policed the “homeland” Bantustans as labour pools, with forcibly resettled Black South Africans assuming migrant work for gold and diamond mining, services in the cities, and farming for white-owned commercial agriculture (Smuts qtd. in Foster, Clark, and York 315-24). Smuts attributed racial differences to ecology, conceiving Black South Africans as “‘children of nature,’ lacking the drive for social ‘progress’” (Smuts qtd. in Foster and

Clark 322). Therefore, Smuts argued, white people of European descent needed to act paternalistically to “conserve what is precious” about both Africa and Black Africans (Smuts qtd. in *ibid.* 322). Europeans could do this through a holistic organizational structure, not material intervention. Individuals operating within segregated communities could believe that individual action benefits everyone, even when the material conditions between communities are dramatically uneven, violent, and some communities benefit from the systemic oppression of marginalized ones.

This organizational drive at the core of holism may surface in the techno-ecology present in mid-century American cyberculture. When Eugene and Howard Odum reconceptualized the ecosystem as a cybernetic idea in post-war ecology—analogizing nature with electrical systems—not only did they make the case that biological reality and human technology operated according to the same universal principles, but they also argued that techno-ecological systems were holistic, and technology could be used in a managerial sense to reach true sustainability.

The Odums’s theories were holistic in the sense of Smuts’s phrase more than the sum of the parts, focusing on how individual entities in a system all acted together in order to preserve the equilibrational action of the whole. In the 1959 edition of Eugene Odum’s classic textbook *Fundamentals of Ecology*, he called his method the “whole-before-the-parts approach to ecology” (vi). In the third edition released in 1971 that included chapters on pollution, environmental health, and “The Ecology of Space Travel,” Odum wrote: “Practice has caught up with theory in ecology. The holistic approach and ecosystem theory, as emphasized in the first two editions of this book, are now matters of world-wide concern. [...] Nature, with our intelligent help, can cope with man’s physiological needs and wastes, but she has no homeostatic mechanisms to cope with bulldozers, concrete, [agroindustry, etc.]” (36). Lydia Kallipoliti highlights the Odums’s holism being “key to understanding and managing Earth’s systems for the good of humanity and all its life forms,” as they advanced “the principles of holistic systems ecology and provided the scientific basis for approaching planning as applied human ecology” (20). Since natural flows of energy were quantifiable in a cybernetic ecosystem, information technologies like computers could theoretically be used to understand and manage enclosed ecosystems to reach certain and purposeful goals. The idea of materially enclosed technologically-regulated ecosystems, like space colonies and the Biosphere 2 project in Arizona, are examples of applied research projects inspired by this thinking of techno-ecological continuum. More immediately, countercultural figures like John and Nancy Todd, who founded the New Alchemy Institute in 1969, credit the Odums’ cybernetic ecosystem theory with inspiring them to begin making eco-friendly technologies, like organic agriculture and bioshelters.

This brief sketch brings us full circle to the setting that Turner argues gives rise to Silicon Valley techno-libertarianism. In closing, I want to stress the importance of the racial history to the concept of holism when environmental media scholars study ecosystems—tech or otherwise. I say this while regarding the proliferation of the Silicon Valley tech ecosystem as an informational capitalist metonymy—[Silicon Cape in Cape Town](#), [Silicon Lagoon/Yabacon Valley in Lagos](#), or, as [\[the Gates Foundation would have it, Silicon Savannah in Nairobi\]](#). Arguably, this expansionist use and abuse of ecological concepts and terms is in line with the rhetoric on display in a recent article by the *World Economic Forum*, titled “[How ‘agritech’ could lead Africa’s rising start-up scene](#)”, that refers to the African continent as the “food basket for the world” where “60% of the world’s unused arable land and 54% of Africa’s population [already] working in the sector [means] the continent has enormous agricultural promise.” Is this tech ecosystem—Africa as smart breadbasket—designed to route the global flows of informational capital to soils already depleted by centuries of exploitation, imperial violence, and land dispossession?

Where Kavita Philip, Lilly Irani, and Paul Dourish have noted the broad terrain of contemporary media phenomena that can be reread, rewritten, and reimagined from a postcolonial computing perspective beyond pronounced cases like information communication for development (5), the same questions should be asked by environmental media researchers about the terms the field relies on, such as holism and the ecosystem. Harper Shalloe’s recent work (2021), for instance, tracks how the concept of emergent holistic ecosystems not only informs the agent-based modelling that guides the biomimetism of media like swarming drones, but also naturalizes the broader coincidence of complexity theory and finance. Tensions, conflicts, and histories need to be mapped and provincialized; California is not exactly a metropole, and conceptualizing digital cultural imperialism today looks different from the NWICO “media imperialism” debates and assumptions about postcolonial agency made by “digital divide” approaches. Are the proliferating tech ecosystems holistic? Of which ecosystem do we speak when studying the global and globalizing platforms of environmental media? What’s at stake in confronting the segregated history of ecological holism, and how does this phrase surface in methodological assumptions when writing about tech ecosystems? While regarding the promises of techno-ecologies, it’s worth recalling that sustainability has also been a term deployed to justify sustaining an unequal present.

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